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CRITICAL THINKING, ATTITUDES, AND VALUES IN HIGHER EDUCATION.
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DESCRIPTORS- *CRITICAL THINKING, *STUDENT ATTITUDES, *VALUES, *COLLEGE STUDENTS, *CHANGING ATTITUDES, STEREOTYPES, DOGMATISM, TEST INTERPRETATION, QUESTIONNAIRES, EAST LANSING, MICHIGAN

THIS STUDY WAS AN INVESTIGATION OF CRITICAL THINKING, ATTITUDES, AND VALUES AMONG COLLEGE STUDENTS, AND THE INTERRELATIONSHIP AMONG THESE FACTORS AND THE CHANGES TAKING PLACE IN THEM AS A RESULT OF EDUCATION. USABLE AND COMPLETE DATA WERE OBTAINED FROM APPROXIMATELY 2,700 FRESHMEN OF MICHIGAN STATE UNIVERSITY WITH A BATTERY OF TESTS AND QUESTIONNAIRES ON THE SUBJECTS IN RELATION TO SEX, CURRICULAR AND RELIGIOUS DIFFERENCES, WITHDRAWAL FROM OR CONTINUANCE IN COLLEGE. CHANGE OF MAJOR, ACADEMIC PERFORMANCE, AND SUCH SOCIOECONOMIC DIFFERENCES AS SIZE OF HOME, COMMUNITY, FATHER'S OCCUPATION, PARENTAL EDUCATION, AND BIRTHPLACE OF PARENTS. TO STUDY THE INTERRELATIONSHIP AMONG THE VARIOUS TEST MEASURES AND BETWEEN MEASURES USED AND ACADEMIC PERFORMANCE, PEARSON PRODUCT-MOMENT CORRELATIONS WERE COMPUTED. THE INITIAL PHASE OF THIS 4-YEAR STUDY HAS SHOWN THAT THERE ARE SIGNIFICANT DIFFERENCES IN ATTITUDES, VALUES, AND CRITICAL THINKING ABILITY AMONG THE STUDENTS WITH DIFFERENT SOCIOCULTURAL BACKGROUNDS, AND STUDENTS MAJORING IN DIFFERENT CURRICULUMS. THE ANALYSIS OF THE PRE- AND POST-TEST RESULTS REVEALED THAT OVER A PERIOD OF TIME THE STUDENTS BECOME LESS STEREOTYPIC, BETTER CRITICAL THINKERS, AND MORE EMERGENT IN THEIR VALUES. (GC)

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A Preliminary Report

CRITICAL THINKING, ATTITUDES, AND VALUES IN HIGHER EDUCATION

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East Lansing
1959

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CHAPTER I

INTRODUCTION

The study of critical thinking, attitudes, and values of college students has received considerable attention in recent years. Previous research has shown that students undergo changes in critical thinking ability, in attitudes, and in values in widely varying degrees while attending college. Webster (78) reported that for Vassar College students, "his data support some previous findings that there are substantial changes in attitudes during college, and that the attitudes expressed will vary with age, sex, and culture". Kelley (38) found that while values measured by the Allport-Vernon-Lindzey Study of Value Test tend to remain fairly stable over a period of time, attitudes, on the other hand, were less stable. Nelson (52) found that religious attitudes held by college students were relatively stable when the students were retested after a lapse of 14 years. Jacob (36) reviewed the research on attitudes and values and concluded that "the impetus to change does not come primarily from the formal educational process". He further suggests that neither the type nor quality of instruction has any significant relationship with students' changes in attitudes and values after four years of college. He feels that "the main overall effect of higher education upon students' values is to bring about general acceptance of a body of standards and attitudes characteristic of college-bred men and women in the American Community. There is more homogeneity and greater consistency of values among students at the end of their four years than when they began".

Although mere attendance at college does not guarantee that a change in an individual's attitudes and values will come about, research has shown that from the freshman to senior year, some changes are evident. Hall (26) found that for certain college programs four years of formal education will contribute very little to developing a set of socially-oriented values. The converse, however, is true for other types of programs. It would appear then, that higher education has some effect on critical thinking ability, attitudes, and values of college students. Whether formal education results in an actual behavioral change or whether these changes may be attributable to the general college environment, age (maturational) or cultural changes is a matter of conjecture.

For the most part, many of the previous investigations on attitudes and values have been carried on with rather atypical groups such as female students from Vassar or Sarah Lawrence College, or have been concerned with limited personality characteristics such as authoritarianism, ethnocentrism, rigidity, or the traits measured by the MMPI. The numerous studies of college students' values have utilized, to a large extent, the Allport-Vernon-Lindzey "Study of Values" test. In addition, the interrelationships of these factors (critical thinking, attitudes, and values) and the changes taking place in them as a result of four years of college attendance have not been adequately studied for large numbers of students or for long periods of time. Although there have been some empirical studies on college students' attitudes and values, they have been "fragmentary in the sense that only one or two measures have been employed" (63). In the last few years, considerably more attention has been paid to studying the college students' total environmental matrix in attempting to explain changes in attitudes and values (39, 53,72). Eddy (16) concluded that "the greatest impact on character occurs as a result of the total campus experiences, especially if the relationship between intellectual training and character is made a real one." Some questions which deserve further study are:

1. What relationship is there between the type of experience (social vs. academic) and an individual's modification of his ability to think critically, his attitudes and his values? Are social-type experiences more directly related to changes in values than to changes in critical thinking and stereotypy? Are academic-type experiences more close-

ly related to "triggering" changes in critical thinking than they are to influencing one's attitudes and values?

2. Does the average college freshman attach more importance to the academic facilities and experiences or is he more concerned with "getting the most out of college socially"?

3. If changes occur, are these changes related to those experiences which are "structured"[1] or are they related to those experiences which are of the informal or unstructured variety.

4. Might we find students who have changed markedly in their attitudes and values during the freshman year to be those students who have been involved to a greater degree in interpersonal type of experiences?

5. Do "rigid" students have a markedly different pattern of experiences from "flexible" students? Do students who possess high "traditional values" differ (in the type of experiences) from those who have low traditional values?

6. Might the particular pattern of one's experiences shed some light on why he did or did not change in critical thinking ability, attitudes, and values during the freshman year?

The scope of this research project means that many questions and hypotheses will develop as the project continues and even more so at its conclusion. The broader questions to which the research is addressed are as follows:

1. What changes in attitudes, values, and critical thinking ability and in the relations thereof take place in students while in college? Are the attitudes and values held by freshmen markedly different from those they hold as sophomores, juniors, and seniors? What factors in the student and in the environment condition the nature and extent of these changes?

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[1] Structured or controlled are used in the sense that the university staff play a significant role in planning these activities.

2. To what extent do attitudes and values explain withdrawals, underperformance, disciplinary problems, variations in grades, change of major, use of counseling and psychiatric services, and the like?

3. If attitudes and values do change after one, two, three, or four years of college, to what factors may these changes be attributed? What part do the controlled experiences play? What part do the uncontrolled (dormitory, fraternity or sorority, informal gatherings) experiences play?

4. To what extent is an individual's self-perception related to his attitudes and values?

5. To what extent are students fully immersed in the college environment with little or no interest in or influence from the "outside" or home community?

6. What aspects of the college environment are most important to students and/or most influential? Do different students have different needs? Are some needs stronger at certain times than at other times?

7. How do environmental conditions and experiences prior to college affect the student's perception of the college environment and the potential effect of the college environment on the students?

The problem and hypotheses studied and presented in this report will now be considered.

THE PROBLEM

The problem studied in this, the initial phase of a four-year study, is that of analyzing the data pertaining to critical thinking, attitudes, and values (as measured by the instruments to be described in the following chapter) in relation to

1. Sex differences
2. Curricular differences
3. Religious differences
4. Withdrawal from and continuance in college

5. Change of major
6. Academic performance
7. Socio-economic differences such as size of home community, father's occupation, parental education, and nativity of parents.

Although there have been numerous studies concerned with one or more of these factors relative to critical thinking, or attitudes, or values, data on thinking ability, on attitudes, and on values have not all been available on any one group.

In addition to studying the interrelationship of critical thinking, attitudes and values and the differences, if any, among the various subgroups, we were concerned with learning whether there were marked changes on some of the variables after one year of college. The specific hypotheses formulated and tested will now be considered.

HYPOTHESES TESTED

Although we were cognizant that many testable hypotheses would emerge as the study progressed, the following hypotheses were generated for the first phase of the study.[1]

1. There is no significant difference in critical thinking ability, attitudes of stereotypy and dogmatism, or the values measured by the D-V Inventory[2] between males and females or among male and female
    a. students in different curricular groups.
    b. Protestants, Catholics, and Jews.
    c. students who have lived a major portion of their lives on a farm, in a small city, or in a large city.

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[1] All hypotheses were stated as null hypotheses, even though it was well known in many cases that the probability was very good that a significant difference would be obtained.

[2] Throughout this report, critical thinking is that ability measured by the Test of Critical Thinking, Form G; attitudes of stereotypy and dogmatism are those traits measured by the Inventory of Beliefs, Form I and Rokeach's Dogmatism Scale, respectively and values are measured by the Differential Values Inventory.

d. students whose parent/s are native or foreign-born.

e. students who plan to receive four years of college education and those who plan to attend graduate or professional school.

f. students who attended a private, parochial, or public high school.

g. students whose fathers completed grade school, high school, college, or graduate (or professional) school.

h. students whose fathers are executives (or managers of business concerns not their own), business owners, white-collar workers, skilled craftsmen, semi-skilled workers, low or unskilled laborers, farm owners, public service workers, and professional personnel (doctor, lawyer, and so forth).

2. There is no significant relationship between (a) the grade a student receives on a common final examination,[1] (b) the grade a student receives from his instructor, and (c) freshman grade-point average, and his ability to think critically, his attitudes and his values.

3. There is no significant difference in critical thinking ability, attitudes, and values between students who withdraw from college and those who complete their freshman year.

4. There is no significant relationship between (a) critical thinking ability and stereotypy, (b) critical thinking ability and dogmatism, (c) critical thinking ability and tradition values, (d) stereotypy and traditional values, (e) stereotypy and dogmatism, and (f) dogmatism and traditional values.

5. There is no significant difference in mean pre-test and post-test scores in critical thinking, stereotypy, and traditional values.

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[1] Common final examinations are given in Natural Science, Social Science, Communication Skills and Humanities. Since all students normally take N.S. and C.S. during their freshman year, this hypothesis will be tested for only the instructor and common final examination grade (each make up 50 per cent of the total grade) in N.S. and C.S.)

Although several hypotheses concerning the dynamics or process of change (in attitudes, values, and critical thinking ability) have been formulated, the testing of these hypotheses and their discussion have been postponed to the next phase of the study. In the present study, insofar as change is concerned, we will report pre- and post-results and comment briefly on the inital analysis of the general immersion score[1] as it relates to change.

The next section will deal with a description of the instruments used, the characteristics of the population studied, and the methods used to analyze the data.

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[1] The extent to which students are involved in activities that are centered in the campus environment.

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CHAPTER II

DESCRIPTION OF INSTRUMENTS USED, THE POPULATION STUDIED, AND THE STATISTICAL TOOLS USED TO ANALYZE THE DATA

Description of Tests.

A variety of instruments were used to measure the subject's overall aptitude, his ability to think critically, his attitudes of stereotypy and dogmatism, and his values. These tests will be described in the next few pages.

A Test of Critical Thinking, Form G. This is a 52-item scale which has been designed to measure five factors thought to be involved in critical thinking (82) -- the ability to (1) define a problem, (2) select pertinent information to solve a problem, (3) recognize stated and unstated assumptions (4) formulate and select relevant and promising hypotheses, and (5) draw valid conclusions and to judge the validity of an inference. It is readily evident that this test only measures the problem-solving aspect of critical thinking. The test is composed solely of verbal-type items and hence relies considerably on the subject's ability to analyze and synthesize verbal facts in contrast to numerical problems. A perfect score is 52.

The Inventory of Beliefs, Form I. Consists of 120 pseudorational statements to which the subject responds by means of a four-element key: strongly agree, agree, disagree, strongly disagree. The subject's score is the number of statements the subject marks disagree or strongly disagree. High scorers might be considered as flexible and/or adaptive, while low scorers might be thought of as rigid, compulsive, or authoritarian (83). Scores could range from 0 - 120. This instrument was used to measure the attitude of stereotypy in contrast to dogmatism measured by Rokeach's scale.

Rokeach's Dogmatism Scale, Form E. This test is a measure of general authoritarianism which differs from the California E and F scales in that it does not attempt to tie authoritarianism with political conservatism or ethnocentrism. The scale consists of 40 statements, the subjects responding to each item on a 7-point agree-disagree scale. The scores could range from 40 - 280. The lower an individual's score, the less dogmatic he is, while the high scorers (240+) are highly dogmatic in their beliefs.

Differential Values Inventory. This scale was used to measure the subject's values. Developed by Prince (59), it consists of 64 forced-choice pairs of items. Each pair of items has a traditional value statement "pitted against" an emergent value statement. The terms traditional and emergent may be explained thusly: An individual is said to have high traditional values if he tends to regard more highly the values of puritan morality, the meaning of work and responsibility, individualism, and an emphasis on the future rather than on the present. In contrast, the individual is said to have low traditional values (or high emergent values) if he tends to regard highly such values as sociability, relativistic moral attitude, conformity, and an emphasis on the present rather than on the future.

The subject chooses either the traditionally-oriented item or the emergent-value item in each of the 64 pairs of items. In addition to obtaining a traditional score, it is possible to obtain eight subscores -- one for each of the value areas measured. The traditional scores can range from 0 - 64 while the subscores have a range from 0 - 16.

Biographical Data Sheet. This instrument consists of 25 questions designed to provide us with routine biographical information, some of which could not be obtained from existing university records.

MSU College Objectives. A list of 26 objectives (10 vocational and 16 general and non-vocational) or goals of education, the subjects responding by means of a 3 element key: very important that this be achieved, important, of little or no importance that this be achieved. Two scores can be obtained from this instrument -- the value a student attaches to the vocationally-oriented objective of higher education, and the degree of importance attached to the liberal or general education aspects of a college education.

College Qualifications Test. Consists of 75 items designed to measure verbal ability, 50 items which measure skill in handling numerical concepts, and 75 items which assess general information (85). The three subscores can be summed to yield a composite or total score.

MSU Reading Test. A 45-item test which was previously developed at Michigan State to measure the subject's ability to comprehend thoughts expressed in reading passages.

The instruments previously described constitute the general test battery which was administered to the freshmen entering Michigan State University in the fall term, 1958 (N = 2,746). In the post-test session, only the Inventory of Beliefs, Test of Critical Thinking, and Differential Value Inventory were readministered. In addition, the Experience Inventory described below, was administered for the first time.

An Experience Inventory. A 50-item scale developed by the research staff to give some indication of the nature and extent to which students are involved or immersed in the campus environment. In addition to the General Immersion score (total possible = 37), one can obtain a Social Experience score, an Academic Experience score, and an Interpersonal Interaction score. The latter three scores are more valuable for suggesting possible factors that may have "triggered" change than as scores, per se.

Allport-Vernon-Lindzey "Study of Values". A 45 item test which measures values based upon Spranger's theory of types, which specifies six types of persons: theoretical, economic, aesthetic, social, political, and religious (84). Since the test employs a forced-choice technique, final scores only reflect the relative intensity of each value and not the absolute strength. Thus, a high score on one value must be compensated for by a lower score elsewhere. Correction figures are applied in an attempt to equalize the popularity of the six values. A final score is obtained for each of the six values.

Wesley's Rigidity Scale. A 51 item pencil and paper test of personality rigidity. Items were chosen empirically and rated for degrees of rigidity by five psychologists. Although the test contains 67 items, sixteen of the items are "fillers". Some of the items are phrased so that a response of true is a measure of personality rigidity. e.g. "I am often the last one to give up trying to do a thing". The other 11 items, if answered false would be indicative of rigidity. e.g. "My interests tend to change quickly". A single score is obtained. The higher the score, the more rigid the individual.

The means, standard deviations, and reliability coefficients for the instruments administered to the population in fall term, 1958, are presented in Table 1.

TABLE 1

Means, Standard Deviations
and Internal Consistency Estimates for
the Cognitive and Affective
Measure on the Pre-Test

Test	Mean*			S.D.			
	Males	Females	Total	Males	Females	Total	r_{tt}
Inventory of Beliefs	62.86	64.77	63.77	14.08	12.84	13.54	.84
Test of Critical Thinking	31.51	31.29	31.40	7.18	7.18	7.16	.79
DVI - Traditional	34.67	33.59	34.15	6.93	6.99	6.98	.75
Future Time	9.32	8.93	9.13	2.74	2.72	2.74	.60
Individualism	8.61	9.02	8.81	2.18	2.04	2.12	.41
Puritan Morality	6.92	7.12	7.02	2.46	2.37	2.42	.51
Work Success	9.82	8.52	9.20	2.76	2.73	2.82	.59
Sociability	8.26	9.20	8.71	2.38	2.40	2.44	.45
Conformity	5.27	5.33	5.30	2.41	2.33	2.37	.48
Relativism	7.70	7.77	7.74	2.63	2.71	2.67	.54
Present Time	8.09	8.04	8.06	2.50	2.42	2.46	.57
Dogmatism Scale	168.19	163.56	165.98	25.36	25.47	25.70	.76
MSU-Reading	27.04	28.14	27.57	6.40	6.37	6.41	.79
CQT - Vocabulary	44.17	47.31	45.68	12.84	12.22	12.65	.90
Information	50.25	44.31	47.42	9.64	9.52	10.04	.84
Numerical	32.03	24.80	28.58	10.04	9.30	10.35	.90
Total score	126.46	116.47	121.70	26.28	24.65	25.95	.93

* N males = 1436
N females = 1310
N total = 2746

The Population Studied[1]

For this preliminary phase of a four-year study, the entire freshman class entering Michigan State University in the fall term, 1958, was tested. Excluding those students who (a) either transferred to Michigan State after attending another college or university or (b) were foreign students, the number of students who were considered to be eligible totaled 2,973. However, since some of these students did not appear at the testing sessions and/or failed to complete the entire general test battery previously decribed and/or had one or more unusable test papers[2], we obtained complete, usable test data for 2,746 students.

Biographical information relating to age, sex, marital status, nativity of parents, size of home community, level of parental education, religion, and father's occupation was obtained for each student[3]. In addition, such information as type and size of high school attended, and educational aspiration (this is, number of years one would like to attend college) was also gathered. These data are presented in Table 2 (in Appendix).

Sex. The population studied consisted of 1436 males (52 per cent) and 1310 females (48 per cent).

Age. Over 80 per cent of the males and females are 18 years of age or younger. It is interesting to note that a larger percentage of the females (32 vs. 24 per cent) are under 18, while a larger percentage of older males can be accounted for, in part at least, by the fact that many may have fulfilled their military obligations.[4]

Marital status. The majority (over 95 per cent) of male and female freshman are single.

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[1] The analysis of data, with the exception of the pre- and post-test data was based on the test scores of this population or a random sample of it.

[2] A major portion of the attrition is attributable to incomplete test papers.

[3] Detailed biographical information was collected primarily for the purpose of studying whether status and change in test variables is related to socio-cultural factors. We already have sufficient data to demonstrate that our student population is quite heterogeneous.

[4] Over one-half of the males (68 out of 129) are attending college on the GI Bill.

There are, however, a small number of widowed and divorced students. It is interesting to note that although Michigan State is often referred to as the "married students mecca"[1] a very small percentage of the freshmen population is married. In addition, a larger percentage (3 vs. 1 per cent) of the freshman males are married.

Nativity of parents. Although there is very little difference in the percentages of males and female freshman students whose parents are both native-born (86 and 85 per cent respectively), it is interesting to note that a small percentage of both our male and female freshman have one or both parents who are foreign born.

Size of home community. Responses to the question "Before coming to college where did you live most of your life"? as presented in Table 2 indicate that insofar as size of home community is concerned, we are dealing with a rather heterogeneous population. The only marked difference between the sexes was in the precentage who lived on a farm -- it is seem that we have a greater percentage of males (16 vs 9 per cent) who lived on a farm. It is also readily evident that over 70 per cent of both sexes lived in a community with a population of 100,000 or less, and 55 per cent of the male freshman (in contrast to 47 per cent of the females) lived in a community with a population of 25,000 or less.[2]

Religious Preference. The majority of males and females (70 and 71 per cent respectively) are Protestants. The next largest group consists of Catholics (18 per cent males and an equal percentage of females) while the Jewish student group is the smallest (6 per cent of the total population). Unlike Protestants and Catholics, there is a larger percentage of Jewish female freshmen (8 vs 5 per cent). Despite the fact that there are only a few cases, it is of interest to note that 54 males (4 per cent) and 18 females (1 per cent) profess to have no religious preference.

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[1] Based on an enrollment of 19,516 students in the fall term, 1958, 6,030 students or 31 per cent of the total MSU on-campus population were living in married quarters supplied by the university.

[2] It is conveivable that those students who live in the suburb of a large city checked the response corresponding to town or small city (25,000 - 100,000 population).

Father's Occupation. If one were to classify occupations into (1) lower class (skilled, semi-skilled and unskilled labor), (2) middle (white collar, public service, farm and business owner) and (3) upper class (executive, professional people and teachers), the data suggest that not only are there marked differences in the number of students in each of three categories but there are rather marked sex difference in each category. Consider, for example, the following: There are marked differences between the sexes in the percentages of those whose fathers are in the lower and upper socio-economic class; the most notable difference between the sexes is in the smaller percentage of females (20 vs 28 per cent) whose fathers are in the skilled, semi- or unskilled labor class and the greater percentage of females (33 vs 23 per cent) whose fathers are either executives or professional people. The data also point out that over 70 per cent of both males and females come from middle-upper class homes as judged by their father's occupation.

It is also of interest to note that the majority of fathers of both males and females (90 and 93 per cent respectively) have only one job.

Mother's Occupation. Recent statistics released by the Secretary of Labor indicate that approximately one-third of our present-day labor force is composed of women. Recognizing that these figures include both married (or divorced) and single (or widowed) women, the data collected in this study, bear out these figures. Over 30 per cent of the students' mothers are engaged in some form of work. The majority of them are business owners, white-collar workers, and teachers.

Parental education. A somewhat similar pattern of the level appears to be evident here as was in the parental occupation discussion above. Although over 80 per cent of the mothers and fathers of males and females have at least some high school education, the differences between the sexes is more marked as one ascends the academic ladder. It would appear that our female freshmen are coming from homes where the level of their parents' education is higher than that for the male students. Whereas only 17 per cent of the fathers and 23 per cent of the mothers of our male freshmen completed 4 years of college or more, 36 per cent of the fathers and 27 per cent of the mothers of the female freshmen possess a comparable amount of college education. In other words, one might say that females come from a higher "parental level of education" home than do their male counterparts. This finding agrees closely with the aforementioned fact that female students tend to have fathers with higher social status occupations.

If one were to consolidate level of parental education and parental occupation into a single measure entitled "socio-economic-educational background", it is evident that our females come from a higher (in terms of level) socio-economic-educational level home.

Secondary school data. Data pertaining to the type and size of high school attended, academic standing in graduating class, and degree of participation in high school activities will be considered in this section.

Ninety per cent of the males and females attended a public high school. A larger percentage of males and females attended a parochial school in contrast to the percentage that attended a private school. The vast majority of freshman students attending Michigan State went to a public high school.

As was evident in dealing with the size of home community, the range of numbers attending high schools differing in size is just as widespread. We have a small percentage who attended a small (under 25 in graduating class) high school (3 per cent) and a slightly smaller percentage (2 per cent) who attended a large (over 1,000 in graduating class) high school. The model response for both males and females was the high school with 100 - 199 students in the graduating class. Some differences between the sexes are the percentage of males (30 vs 23 per cent) who attended a small high school in contrast to the percentage of females (20 vs 17 per cent) who attended a fairly large high school. These findings are consistent with those pertaining to size of home community. Since a larger percentage of males lived in a small community, we would expect a larger percentage of males than females would attend a small high school.

The findings in this study concur with previous research findings regarding the academic superiority of female high school students. Whereas 75 per cent of the females ranked in the upper third of their high school graduating class, only 57 per cent of the males are in that category. It is also evident that a greater percentage of freshmen males (5 vs 2 per cent) ranked in the lower-third of their high school graduating class.

With reference to the extent or degree of participation in high school activities, there is very little difference between the sexes. What is most notable, however, is the fact that a larger percentage of females (54 vs 40 per cent) stated that they were very active. We must recognize of course, that on such a question, there may be discrepancy and variance in the definition of the term "participation". Responses to the majority of the questions were not influenced by differing definitions as would be encountered in a question such as this. In spite of this problem of semantics, it is evident that we have a freshman population who were involved to some degree at least, in high school activities.

Education Plans. As one might expect, a significantly larger percentage (40 vs 17 per cent) of males want to attend graduate or professional school. At the same time, 7 per cent of the females (no males) stated that they did not wish to obtain a baccaulaureate degree. This is not unexpected when one realizes that Michigan State offers many two-year terminal courses. A point of interest is the differences present between level of education desired and level of education expected. Although 40 per cent of the males would like to attend graduate or professional school, only 25 per cent actually expect to do so. At the same time, although there were no males who wanted to attend college for less than 4 years, 4 per cent stated that they do not expect to complete 4 years of college. Unlike the males, the female freshmen are less optimistic -- 7 per cent do not want more than 3 years and yet 14 per cent stated that they do not expect to attend college for more than 3 years. From the data presented, it would appear that males are more inclined to go to graduate or professional school although some of them are unsure whether they will succeed. Females, on the other hand, are quite content to get just 4 years of a college education but are more pessimistic as to the probability of them completing their college education.

Source of Support. The data indicate that males are less likely to be solely dependent upon their parents for financial support while at college (63 vs 85 per cent). Males are frequently able to receive assistance in restricted scholarships (3 per cent) or the GI Bill (5 vs 1 per cent) than females who seldom have these recourses. In spite of this, a larger percentage of males (19 vs 5 per cent) are working their way through college. It is of interest to note that while females tend to receive better grades in high school, an equal proportion of males and females (8 per cent) are at Michigan State on an academic scholarship. It is also evident that a small number of students (1 per cent) have borrowed money to further their education. For all intents and purposes, we can say that insofar as the 1958 freshman population at MSU is concerned, parents are the major source of financial support for both males and females.

Major. For the males, engineering and business and public service rank first and second respectively in the choice of a major. Males are to be found in varying degrees in all the curricula (only 2 in home economics). It is evident that elementary education is least popular for the males. On the other hand, the largest proportion (24 per cent) of the females are majoring in science and arts while following close behind (21 per cent) is education. In comparing data for previous freshman classes, it is seen that there has been very little change in the percentage of males majoring in engineering. In fact, it would appear that insofar as our college of engineering is concerned, the "post-sputnik" bulge is yet to come. A point of interest is the number of students who fail to declare a major (no preference). Whereas approximately 14 per cent of the freshman population are in the "no preference" category, there is a slightly higher percentage of females (15 vs 13 per cent) who fail to declare a major at the beginning of their freshman year. It is also interesting to see the cleavage that exists between technical or science-type curricula such as engineering, veterinary medicine and non-technical curricula such as business and public service and education insofar as the females are concerned. Females are more interested in teaching, liberal education courses such as social science, and humanities, while the largest proportion of males prefer courses in engineering. These findings are in agreement with those of other researchers in the area of interests.

It is readily evident from the description of the population studied that there are similarities and dissimilarities between the sexes on the variables considered. A point of interest is on other variables on which there are marked sex differences: socio-economic-educational home background, rank in high school graduating class, education aspiration (and expectation), major source of financial support, degree of participation in high school activities, and choice of major. In contrast, there is very little difference between males and females in age, marital status, nativity of parents, type of secondary school attended and religion. Previous research has shown that there are significant sex differences in attitudes and values. One might hypothesize that these sex differences reflect, in part at least, socio-cultural differences between males and females. Recognizing these differences, one might consolidate the data presented in Table 2 and construct a profile which would describe the hypothetical 1958 Michigan State freshman. It should be remembered from the outset that this is not a description of the typical freshman student but only a profile based on majority responses to the biographical questionnaire.

> He is 18 years of age, single, and a Protestant. Prior to enrolling at Michigan State, he lived most of his life in a community with a population of under 100,000. He attended a public high school that had less than 200 students in the graduating class and ranked in the upper-half of his class. While at high, he participated (in a moderate sense) in the activities offered. Both his parents are native-born and had high school or some college education. His father's occupation would be classed in the middle socio-economic stratum. His mother is a housewife and his father holds only one job. His parental relationship is good. While going through college, he is primarily dependent upon his family for financial support. He would like and expects to attend college for four years and he chooses to major in a technical or vocationally-oriented curricula rather than just get a broad general education in the humanities or social sciences. He is presently living in a dormitory on campus.

Method

The data on critical thinking ability, attitudes, and values were collected during the Fall term 1958 and again in the Spring term, 1959. The population previously described was used to study (1) differences among sub-groups (such as religion, parental education, and so forth) in the measures used, and (2) the interrelationships among the variables of critical thinking, attitudes, and values. To study differences in cognitive and affective variables between students who withdrew from college before completing their freshman year and those students who completed their freshman year, the test scores of a random sample of the original population was used. To study differences in test scores between the pre- and post-test sessions, all subjects who were still enrolled at Michigan State (and for whom retest scores could be obtained) as of May 15, 1959 were used.

Since the procedure in the pre- and post-test sessions differed they will be considered separately.

Pre-Test Session. All entering freshmen at Michigan State University are given a battery of psychological tests during Orientation Week. In addition to the CQT, MSU Reading and MSU Arithmetic tests which are routinely administered to all students entering MSU for the first time[1], the battery of CTAV instruments was administered to these students in a special 3 1/2-hour session. In addition to this, some experimental tests were administered to smaller groups (N = 500) in another special two-hour testing session.

In the pre-test session, all subjects in our population were administered the routine psychological and aptitude tests, the Test of Critical Thinking, the Inventory of Beliefs, Rokeach's Dogmatism Scale, the Differential Values Inventory[2], the College

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[1] The only exceptions are graduate students or those students who have already taken one or more tests at another institution (these are not required to repeat any of the tests).

[2] Hereafter referred to as CT, IB, D-Scale 1, and DVI respectively.

Objectives Inventory, and a Biographical Data Questionnaire. Complete, usable test data were obtained from 2,746 entering freshmen (93 per cent of the total new freshman class).

Post-Test Session. During the spring term, 1959 (May 18 - 25), those subjects enrolled in the third-term course of Natural Science were given the Test of Critical Thinking, the Inventory of Beliefs, the Differential Values Inventory and the Experience Inventory[1] in their regular two-hour laboratory period. This method enabled us to retest 1,872 subjects from our original remaining population (77 per cent).[2] For the 445 subjects in our study not enrolled in this course, special testing sessions were conducted during the week of May 11. For thosee subjects who were either absent from class the day our instruments were administered or were unable to attend one of the special testing sessions, two special "make-up" sessions were held on May 27 and June 4. After removing incomplete answer sheets, we obtained complete, usable test data on 2,219 students (95 per cent of the original sample still enrolled in college).

The data obtained in the post-test session was analyzed to determine whether there is a significant difference in mean pre- and post-test scores for the population in critical thinking ability, attitudes of stereotypy, and values measured by the Differential Values Inventory.

The data pertaining to the interrelationship among the test variables, differences among the various sub-groups, and change in mean test score between the fall and spring testing sessions were analyzed by standard statistical tools. (Pearson product-moment correlation, analysis of variance or covariance, and "t" tests.)

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[1] Although it would have been desirable to re-administer the Dogmatism and College Objectives scales, lack of time prohibited us from doing so.

[2] Three hundred and three subjects who were in the study in the fall term, 1958, withdrew from college during the year.

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CHAPTER III

FINDINGS

Since we are dealing with two populations (pre- and post-test samples), a variety of measures, and numerous hypotheses, we will consider the data pertaining to the fall sample and spring sample separately. Unless otherwise noted, the fall, 1958 data are for a sample of 2,746 cases, while the spring data are for a sample of 2,219 cases.

Fall, 1958 Data

Previous research has shown that there are significant sex differences in attitudes and values (84). As seen in Tables 3 and 4 (in Appendix), there are significant sex differences for all the variables except that of the Test of Critical Thinking and Wesley's Rigidity Scale. It is also evident from this table that there is no consistency among males and females either in mean test score or in variability. The males have a significantly higher mean score for traditional values, dogmatism,[1] and overall aptitude measured by the CQT-Total Score. The males are also more variable in stereotypy as measured by the Inventory of Beliefs, in their ability to think critically, in their reading and CQT-Total Score. The females, on the other hand, have significantly higher mean reading scores and IB scores. There is also more variability among females in their traditional value and dogmatism scores.

In comparing the scores between males and females, our results suggest that males entering college are more apt to be more stereotypic in their beliefs, more dogmatic, tend to regard more highly the values of puritan morality, the meaning of work and responsibility, individualism, and emphasis on the future rather than the present, and display more ability on a test of general aptitude such as the CQT. The females in our study, on the other hand, are more flexiable, less dogmatic, better readers, and are more emergent in their values.[1]

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[1] A high score on the dogmatism scales signifies a high degree of dogmatism while a low score on the Inventory of Beliefs signifies a low degree of stereotypy. In other words, a high score on the D-Scale 1 corresponds to a low score on the IB and vice versa.

Since significant sex differences were found on all but one of our major scales, it was felt that all further analysis of the data should consider the sexes separately.

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[1] A person is said to have high emergent values if he tends to regard more highly the values of sociability, conformity, relativistic morals and an emphsis on the present rather than the past or future.

HYPOTHESIS I: CRITICAL THINKING ABILITY, ATTITUDE AND VALUE DIFFERENCES AMONG SELECTED SUB-GROUPS OF THE POPULATION[1]

1. Curriculum Groups. That there are differences in critical thinking ability, stereotypy, dogmatism, and traditional values among females in the different colleges is evident from the data presented in Table 5. A further analysis of the data indicated that these differences are statistically significant. Females majoring in veterinary medicine[2], science and arts, and communication arts are better on the reading and CQT test than are females in the colleges of business and public service, home economics, and education. It is interesting to note that those students who had not chosen a major (hereafter referred to as "no pref") were in the middle of the continuum. Inasmuch as there is a slight (but significant), positive relationship among the cognitive[3] and affective measures used, it was felt that differences among females in the seven colleges might be accounted for, in part at least by the factor of general academic aptitude (CQT total score). Analysis of covariance was used to control this suspected influence and it was found that significant differences in stereotypy still exist among females in the different colleges. Hence, we can conclude that even when adjustments are made for CQT score, the differences are still present and in the same direction. Comparable findings were obtained when adjustments were made in the dogmatism and value scores.

The trend appears to be that those scoring high in the cognitive area tend to possess or exhibit less stereotypic beliefs, are less dogmatic, and are more apt to regard highly the traditional values. A notable exception to this, is the females in medical technology, although the highest scorers in the cognitive measures, are the most stereotypic and dogmatic curricular group, but at the same time, are the most traditional in their values.

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[1] The Tables pertaining to this hypothesis are found in the Appendix.

[2] For the most part, these females are preparing to become medical technologists.

[3] Test of Critical Thinking, MSU Reading and CQT tests.

It is also evident that high IB-scoring[1] female students enter the fields of science and arts and communication arts while low scorers enter home economics and veterinary medicine. Inasmuch as a large number of the females majoring in science and arts are to be found in the humanities and social science division, it would appear that while high IB's are in the non-technical colleges, low IB's prefer technical or vocationally-oriented curricula. A somewhat similar pattern, that is the less dogmatic students tend to enter non vocationally-oriented curricula while the more dogmatic student seems to favor the vocationally-oriented colleges such as home economics, education or veterinary medicine appears to be operating insofar as the degree of dogmatism is concerned. There is some indication that the more traditionally oriented females may prefer the more technically or vocationally oriented curricula.

Table 6 contains the data for the male freshmen on the instruments used. Once again, it is seen that there are marked differences among males in the different colleges in regard to their critical thinking ability, their attitudes of stereotypy and dogmatism, their values and the cognitive measures. An analysis of covariance revealed (as it did for the females) that these differences could not be accounted for in terms of a general academic aptitude factor.

While males in science and arts and engineering ranked first and second respectively in the cognitive measures, those in agriculture and education ranked at the bottom end of the scale. In other words, both males and females in science and arts were better readers, had higher critical thinking scores, and displayed better academic aptitude than students majoring in other colleges[2] while the converse was true for the males and females in education. Unlike the females, there was no trend evident that those scoring high in the cognitive measures scored in a particular direction on the affective measures.

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[1] A high IB score denotes non-stereotypy while a low score denotes stereotypy.

[2] These findings are in consistent with the results of previous research.

This is so despite the fact that the test intercorrelations are not markedly different between males and females.

While the least stereotypic females tended to favor the humanities and social science curricula, the least stereotypic males are drawn to the physical and biological sciences. On the other hand while the more stereotypic female is to be found in medical technology, the more stereotypic male is enrolled in education.[1]

It is also interesting to note that the more stereotypic, more dogmatic and less traditionally-oriented male student is found in physical education (he is also poorest on the cognitive measures). The only evident pattern for the more-able student in terms of cognitive measures is that he is found in either science and arts or engineering.

In summary, it is evident that for both males and females, there are significant differences between the various curricular groups on the cognitive and affective measures. Even when the factor of academic ability was controlled, the differences in the affective area still persisted.

At this point in our investigation, many problems are as yet unresolved. Are the more rigid, and stereotypic students attracted more toward the structure and security of the vocationally-oriented colleges such as veterinary medicine and education, or engineering, and if so, what might be the reason? What accounts for the more traditionally-minded student being attracted to veterinary medicine, science and arts or agriculture? Why is there a pattern evident for high-scoring females but not for males?

2. Religious Groups. Reference to Tables 7 and 8 reveals that there are marked differences in the mean score on the cognitive and affective measures among Catholics, Jews, and Protestants for both males and females. These differences are significant for females on all the variables. For the males, the differences are significant on all variables except that of critical thinking. For both males and females, Jewish students

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[1] Actually, physical education, health, and recreation in contrast to elementary education.

are least stereotypic while MCU Catholic students are most stereotypic. The same is true for dogmatism. In values, Catholics are most traditional while Jews are most emergent. On the cognitive measures, Protestant females and Jewish males have the highest mean scores among the female and male religious groups respectively.

It has previously been shown that there is a significant difference between males and females on all the variables except that of critical thinking. Reference to Table 3 reveals that females are less stereotypic, have more emergent values and are less dogmatic. That this is so even when the groups are stratified according to religious preference is revealed by the data in Tables 7 and 8.

Generally speaking, the results are in the expected direction. Previous research has indicated that females are better readers, Catholics are more dogmatic and stereotypic than Jews or Protestants and Jewish students are usually the better group in terms of academic achievement and general academic aptitude. It is difficult to make any clear statement to explain why there are significant sex differences in attitudes, values, and critical thinking ability. Child-rearing practices and social mores, different experiences, aspirations, social roles, and countless other factors play some part in causing these differences.

That there are differences in cognitive and affective measures among Protestants is revealed by the data in Tables 9 and 10. For the males, the trend is for those scoring high in the cognitive measures to be less stereotypic, less dogmatic and more emergent. No such pattern is evident for female Protestants. Whereas Presbyterian males are less stereotypic and dogmatic and more emergent in their values, Baptist males are more stereotypic, more dogmatic, and more traditionally-oriented. Although the factor of general academic aptitude might account for some of the differences, the researchers feel that it may be more due to the basic religious practices in the different Protestant churches.

It is evident that those students (both males and females) who profess to have no religious affiliation are the least stereotypic and dogmatic group and are less traditional in values than either Protestants or Catholics. Although the "no religious preference" group have more academic aptitude than any of the other groups, this is not prima facie evidence that intelligent people are atheists or vice versa. By the same token, it is difficult to prove that such students are more "open-minded in their attitudes and beliefs because they have not been subjected to any religious dogma. These findings do raise a question that is worthy of further research -- what factor/s operate to result in these students behaving in such a manner?

3. Size of home community. That there is a difference in intelligence between rural and urban pupils or between males and females needs little documentation. Reference to Tables 11 and 12 reveals that the difference in CQT scores was more marked between farm students and those who came from a town than it was between farm and city students. What might be of more significance is that there is no significant difference among farm, small town, and urban students in their critical thinking ability. This is true for both males and females.

Considering the life in a small community as contrasted with that in a large urban metropolis, one might hypothesize that there would be marked differences between town (or farm) and city dwellers in their attitudes and values. From the data presented in Tables 11 and 12, it is evident that for females, there is very little difference in their attitudes of stereotypy and dogmatism and in the cognitive measures used. In fact, the only significant difference among the females was on the DVI where females from the farm are more traditionally value-oriented while females from a large city are more emergent in their values.

For the males, on the other hand, there is a significant difference on all the variables except that of critical thinking. Males who lived most of their life on a farm are more stereotypic and dogmatic and have the highest traditional value score. While they are the poorest readers and have the lowest CQT score, an analysis of covariance indicated that the differences could not be accounted for in terms of a general academic aptitude factor. Why then the difference for males? Why does this discrepancy exist for males but not for females? Are male farm children reared in a markedly different fashion from their female counterparts? These questions unfortunately are beyond the scope of this investigation but they do suggest an area for further research.

4. Type of secondary school attended. It has already been shown that there are significant differences in attitudes and values among both male and female Protestants, Catholics, and Jews. In this study as well as that of Prince (59), it is seen that parochial school students have the highest traditional score on the DVI. From Tables 13 and 14 it is evident that students who attended a parochial high school are most stereotypic and dogmatic while public high school graduates are least stereotypic and dogmatic. The differences are, in fact, statistically significant not only for the total group but for males and females even after an adjustment was made for differences existing among the groups in academic aptitude.

These findings are, in general, consistent with those of different religious groups. It has already been shown that Catholic students are more stereotypic and dogmatic and have higher traditional value scores than either Protestants or Jews. Since the majority of our students who attended a parochial high school are Catholics, it is to be expected that graduates of parochial schools would be more stereotypic in their beliefs, more dogmatic; and more apt to regard highly the values of puritan morality, meaning of work and responsibility, and emphasis on the future.

4. Socio-economic-educational groups. Sociologists have shown that there are cultural differences in attitudes and values. Since cultural differences can extend over a wide area, it was decided that in this study, we would look at attitude and value differences among students who came from homes which differed in terms of father's occupation and parental level of education. It is conceivable that students coming from a home where their parents only completed grade school and where the father is a skilled laborer would have a different set of values than students who came from homes where their parents completed college and where the father is in the professional or executive stratum of society. The data for the females are presented in Table 15, 17 and 19. The differences in attitudes and

values among the various level of parental education groups are statistically significant. The trend appears to be that those students whose fathers or mothers have a high level of education are less stereotypic and dogmatic, have lower traditional values scores, and have higher general academic aptitude scores. There is no marked difference among these groups in critical thinking ability. It would appear that there is some relationship between parental education and student attitudes and values. Our data indicate that there are significant differences in attitudes and values among students coming from different "level of parental education" homes. This, no doubt, is a direct reflection of the attitudes and values practiced and fostered in these homes. This and other studies tend to support the thesis that although there is a common value structure present, there are variations among and within socio-economic-cultural groups. Granted there are differences among these groups in academic aptitude, but it is doubtful whether this could account for a large part of the variance. It is interesting to note that females coming from homes where their father did not have any college education are more stereotypic and less dogmatic than those students whose father had some college education. Insofar as values are concerned, the converse is true. A similar pattern is evident when one examines the data regarding level of mother's education. It is also of interest to note that although a larger percentage of fathers attended and completed graduate school, a larger percentage of the mothers completed high school and attended (or completed) college. Once again, many questions are left unanswered. Why are children of less-educated parents more stereotypic in their beliefs? Why are they, at the same time, less dogmatic? Why are they more apt to regard highly the values of puritan morality and the meaning of work and responsibility? Why do they have less general academic aptitude?

Another method of obtaining an index of socio-economic-cultural background is to look at the father's occupation. Reference to Table 15 indicates that there is a significant difference in mean test scores among the different groups. If the categories with

N = 18 and "deceased or retired" are disregarded, the trend appears to be that those scoring high in the cognitive areas are less stereotypic, less dogmatic, and are less "traditionally" oriented than those students scoring low in the cognitive areas. Looking at the various occupations in terms of a social stratum continuum, it would appear that those students coming from the upper end of the social continuum (that is those whose fathers are in the professional or executive class) although displaying less stereotypy and dogmatism than those students from the lower end of the social continuum, are, also, more emergent in their values[1] In other words "high" social stratum students appear to be more concerned with sociability, conformity and an emphasis on the present than they are with looking towards the future and the meaning of work and responsibility. This indeed, might well be a reflection of their upbringing more so than their academic aptitude or intelligence.

Earlier in this report, it was shown that students who lived a major portion of their life on a farm had a significantly higher traditional score than those who come from an urban center. It is readily evident that this same pattern exists when one refers to the scores of female students whose fathers are farm owners. Whereas the students of farm owners (excluding tenant and migrant farm workers) have the highest traditional value score, those students whose fathers are in the professional class exhibit an opposite pattern. Since the relationship between DVI and CQT score is nearly non-existent, we must conclude that value differences between farm and urban students are a reflection of values fostered and practiced in the home[2]

One might contend that attitudes and values might be different among students whose parents were native and foreign-born. Some investigators (14, 27, 31) have shown that there are cultural differences in attitudes and values. The data presented in Table 21 indicates that for females, the differences are very small. A further analysis showed that none of the differences are statistically significant. It may well be that cultural differences are not reflected in this study because of the probability that foreign-born parents are, for all intents and purposes, acclimatized to the American way-of-life.

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[1] These findings are in agreement with those of previous research in attitudinal and value difference among different social classes.

[2] One would expect that rural (farm) students be more concerned with traditional values than say urban students.

For the males, the socio-economic-education background data are presented in Table 16, 18 and 20. Insofar as amount of schooling obtained is concerned, a similar pattern exists for the males as for the females. That is to say, those students whose parents attended and completed college are less stereotypic in their beliefs, think more critically, are less dogmatic, and have lower traditional values than are those students who only attended or completed high school. Unlike the females, however, there is a significant difference in critical thinking ability among those males whose fathers completed high school and those whose fathers completed college. For both males and females it would appear that the more education the father has, the more stereotypic and less dogmatic his children while the converse is true for traditional values. It is also of interest to note that for both males and females, a larger percentage of the fathers attended or completed graduate school while a larger percentage of the mothers have [illegible] high school education.

Table 16 presents the test scores for the various occupation groups. As was seen for the females, there is a significant difference in the cognitive areas, but on the affective measures, the only significant differences among the occupational groups is on the DVI. In other words, those students from the "high" social stratum (fathers are executives or professional people) have a higher critical thinking and CQT score but are more emergent in their values than those students from the "low" social Stratum (fathers are laborers). Once again, students who lived a major portion of their life on a farm and whose fathers were farm owners had the highest traditional value score.

The data presented in Table 22 reveals that for the males, there is no marked difference among the "nativity of parents" subgroups in the affective domain. There is, however, a significant difference in the cognitive (reading and CQT total) measures. The students whose parents are both foreign-born have a significantly higher mean reading and CQT total score. This pattern, however, is not evident for the female population.

5. Amount of education desired. That there is a difference in attitudes, values, and the cognitive measures between those students who only wish to obtain a baccalaureate degree and those who desire to attend graduate or professional school is readily evident when reference is made to Table 23 and 24. Females who desire less than four years of college have lower critical thinking, reading, and academic aptitude scores; they are more stereotypic, less dogmatic, and less traditionally oriented than their counterparts who desire four or more years of college. Whether the academic aptitude of the students has some influence on their aspirations is a matter of conjecture.

Reference to Table 24 reveals that MSU male freshmen who wish to attend college for only four years are, as a group, more stereotypic, more dogmatic, and have a lower mean traditional value score than their counterparts who would like to go to college for five or more years.

Summary

To study differences in critical thinking ability, attitudes of stereotypy and dogmatism, high regard for traditional values, reading ability, and general academic aptitude among different sub-groups of the 1958 freshman class, analysis of variance (or covariance) was used. When it was evident that there was a significant sex difference for all the variables but that of critical thinking ability, the data for males and females were treated separately. A summary of the analyses made is presented in Tables 25 and 26. Of the 102 analyses of variance performed, 15 F's for the female population were not significant at the 5 per cent level while 13 F's for the male population were not significant. Some of the major findings (which are to be interpreted in terms of group differences) may be summarized in the following statements:

1. Catholics (both male and female) are more stereotypic in their beliefs, more dogmatic, and have higher traditional values than either Protestants or Jews.
2. Insofar as attitudes and values are concerned, there is no significant difference in mean test scores (stereotypy, dogmatism, traditional values) between those students whose parents were native or foreign-born.
3. There is a marked difference in critical thinking ability, attitudes, and values among students majoring in different curricula. Both males and females in the College of Veterinary Medicine[1] have the highest mean traditional value score. Whereas the females in the VM are most stereotypic, this was not so for the males in Veterinary Medicine. It is also interesting to note that females who display very little stereotypy are more apt to be found in the non-technical or non-vocationally-oriented (humanities, social science) curricula while the males who display more stereotypy tend to select the scientific or technical curricula.
4. Students who lived a major portion of their life on a farm or in a small community have a significantly higher traditional value score than those who come from an urban center. At the same time, those students who came from the "high" social stratum (as determined by father's occupation) are less apt to regard highly the traditional values as measured by the DVI than are those students from the "low or middle" social class stratum.
5. For both males and females, there is a significant difference in critical thinking, attitudes, and values among those not desiring to attend col-

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[1] Females are in medical technology.

lege for four years, those who only wish to receive a baccalaureate degree and those who desire to attend college for more than four years. Not only do the latter have higher mean aptitude scores, they also exhibit a lesser amount of stereotypy and dogmatism and have higher mean traditional value scores.

6. It is readily evident that the factor of general academic aptitude can not account for the existing differences. Although the magnitude of F was lowered in all instances, there was no appreciable difference in mean test score even after adjustments were made for differences in CQT score among the sub-groups.

Some of the major differences among students with different socio-cultural backgrounds have been noted above. The extensive comparisons made revealed many statistically significant differences among the groups which can be summarized in somewhat over-generalized sketches.[1]

> The highly non-stereotypic male (or female) freshman at Michigan State University tended to be above average in general academic aptitude and critical thinking ability, but more emergent in his values. He would either be Jewish or a Presbyterian who lived a major portion of his life in a city of 25,000 - 100,000 population, and attended a public high school. Both parents completed college and had some graduate or professional school training. His father would, more likely be a professional man or teacher than a business owner. This non-stereotypic male would be majoring in a technical curricula such as the physical or biological sciences and aspires to obtain at least 5 years of a college education.

A somewhat different profile is obtained for the stereotypic student

> The highly stereotypic male (or female) freshman at Michigan State University tended to be somewhat below average in general academic aptitude and critical thinking ability, but highly traditional in his values. He is

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[1] The only socio-cultural difference is in the size of home community -- the highly non-stereotypic female comes from a village while the highly stereotypic male lived a major portion of his life in a city of 25,000 - 100,000 population. Hence the sketches are applicable to either males or females.

> most likely to be a Catholic or Baptist who lived a major portion of his life on a farm and attended a parochial school. Both parents completed grade school and it is very unlikely that either one went beyond high school. His father would more than likely be a semi-skilled laborer. Both parents are more likely to be foreign-born rather than native Americans. He intends to go to college for only four years and is majoring in a vocationally oriented curriculum such as physical education, agriculture, or business and public service.

The major differences between the stereotypic and highly traditional (as measured by by the DVI) student or the non-stereotypic and highly emergent student appear to be more related to socio-economic and religious factors than to educational aspirations, academic aptitude, and level of parental education.

It would appear, then, that factors related to one's socio-cultural background are quite operative insofar as attitudes and values are concerned. We must be cognizant of the fact that there are differences among the various social classes in the attitudes and values practiced and fostered in the home. Recognizing that these and other factors are operating in a dynamic and continuous interaction it is readily evident that these socio-cultural factors play an important role in determining the extent or degree to which changes may come about as the result of a college education.

HYPOTHESIS II: THE RELATIONSHIP BETWEEN THE VARIOUS COGNITIVE AND AFFECTIVE VARIABLES[1]

One part of the analysis of the test results was concerned with the intercorrelations between the various cognitive and non-cognitive variables. Some investigators have shown some relationship between values and some social attitudes. Evidence has been reported to show a slight but positive relationship between critical thinking ability and stereotypy (14); dogmatism and intelligence (55); and stereotypy and intelligence (14). Of particular interest was the intercorrelation among the tests used in this study. The intercorrelation matix for the pre-test battery is presented separately for males and females in Table 27. In order to clarify some of the relationships involved, the intercorrelations among the various types of tests (attitude, value, and cognitive measures) will be discussed below.

Attitude tests. There were two attitude tests(Inventory of Beliefs, and the Dogmatism Scale) which were administered to the total group (N = 2,746) and a third test (Wesley's Rigidity Scale) which was administered to a random sample of 484 students. The analysis pertaining to the relationship among the three attitude measures was based on the latter sample. All three measures are interrelated both positively and significantly. These findings are in agreement with the findings of Rokeach (61) and Glanzer and Glaser (22) concerning the relationship between rigidity and dogmatism.

Table 28 presents the correlation matrix for males and females separately. It can be seen that for males there is a significant[2] relationship among the three attitude scales, but for the females, there is a significant relationship only between the IB and the dogmatism scale and between the dogmatism scale and the rigidity scale.

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[1] The Tables pertaining to Hypothesis II are located in the Appendix.

[2] Although the "r" between the IB and Rokeach's Dogmatism Scale or the IB and Wesley's Rigidity Scale appears negative it does so because of the reverse type of scoring employed. A high score on the Dogmatism or Rigidity Scale corresponds to a low score on the IB and vice versa.

The relationship between rigidity and stereotypy although positive, is not statistically significant. It would appear from the foregoing table that the traits of stereotypy and dogmatism, that is, those measured by the IB and D-scale 1 respectively, are more closely related than are the traits of either stereotypy and rigidity or dogmatism and rigidity. As recognized by many researchers, the term "rigidity" is indeed a flexible concept, depending upon the type of test being used. On the basis of patterns of relationships displayed, the IB and Dogmatism scale appear to be appropriately grouped. Wesley's Rigidity Scale belongs in a separate category even though it is somewhat related to stereotypy and dogmatism.

Value Tests. Two value tests, the Differential Values Inventory and the Allport-Vernon-Lindzey "Study of Values" were used in this study. The former was administered to the total entering freshman group (N = 2,746) while the latter was administered to a random sample of 453 students[1]. The analysis will be based on the data of the latter group (N = 453). Inasmuch as both the DVI and the Study of Values both had Spranger's system as a frame of reference, one might expect that some of the subtests would be significantly correlated with each other. That this is so is readily evident from the data presented in Table 29. It would appear that the Religious Scale of the Study of Values measures traits comparable to what is measured by the traditional scales (future-time orientation, individualism, puritan morality, and work-success ethic) of the DVI as is evidenced by the positive and significant correlations for both males and females between these sub-scales of the DVI and the Religious scale. Another point of interest is the significant negative correlations between the Religious scale and the emergent scales of the DVI.

For the males, the traditional score of the DVI is negatively and significantly correlated with the Economic and Political values while a neglibible relationship exists between the traditional score and the Theoretical, Aesthetic, and Social values. For the females, on the other hand, there is a significant positive correlation between the traditional score of the DVI, and the Theoretical value; a significant negative correlation between the traditional score and the Aesthetic and Political values; and a negligible relationship between the traditional score and Economic and Social values. As would be expected, for both males and females, the correlation between the sociability scale of the DVI and the Social value scale is positive and significant.

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[1] Although 595 students were tested with the Study of Values Test, usable test results were available for only 453 students.

Inasmuch as the Differential Values Inventory consists of 8 subtests, it was felt that it would be desirable to look at the intercorrelations among the various subtests. Since the theory underlying the development of the DVI was to have traditional-value items matched against emergent-value items, one would expect to find a high positive relationship among the four traditional-value subtests, and a high positive correlation among the four emergent-value subtests. Moreover, a negative correlation among the four traditional-value and four emergent value subtests would be anticipated.

Reference to Table 27 reveals that the four scales measuring traditional values (Puritan morality, work-success ethic, future-time orientation, and individualism) are significantly correlated ($p<.05$); the four scales measuring emergent values (conformity, relativism, sociability, and present-time orientation) are significantly correlated ($p<.05$); and the intercorrelations among the traditional-value and emergent value subtests are negatively correlated and significant ($p<.05$).

Attitudes and Values. For practical purposes, the findings indicate that there is little or no relationship between attitudes of stereotypy and dogmatism and the values measured by the Differential Values Inventory. Reference to Table 27 reveals that the only correlations that are statistically significant (but negligible from a practical standpoint) are those depicting the relationship between traditional values and dogmatism (r's are .09 and .10 for males and females respectively). Why this is true for dogmatism but not for stereotypy is a matter of further inquiry since there appears to be a substantial relationship between stereotypy and dogmatism (.63 and .61 for males and females respectively). It would appear that results such as these confirm the suspicion that although our present measures of stereotypy and dogmatism are similar, they do measure somewhat different traits.

It is apparent from Table 28, that a slight positive relationship exists between the Differential Values Inventory traditional score and rigidity as measured by Wesley's Rigidity Scale. That is, those holding high traditional values are also likely to be somewhat more rigid in attitudes.

Cognitive Tests. The three cognitive measures used for the total entering Fall, 1958 freshman class (N = 2,746) were the Test of Critical Thinking, the MSU Reading Test, and the College Qualifications Test (hereafter referred to as the CQT). From the data in Table 27, it is evident that for both males and females, there is a positive and moderately high relationship between critical thinking and reading ability (.60 and .61 for females and males respectively) and between critical thinking and general academic aptitude as measured by the total score of the CQT (.60 and .61 for females and males respectively). It would appear that some factor (or factors) is common to the three cognitive measures used. It is also evident that the factor of verbal facility (i.e., vocabulary) may not account for all the variance present. The findings regarding the intercorrelation among the cognitive measures are in agreement with those of Saupe (65), Dressel and Mayhew (14) and the Test of Critical Thinking manual (82) concerning the relationship between critical thinking and reading or verbal comprehension.[1]

Interrelationships Between Cognitive and Affective Measures. The material presented in the preceeding sections has dealt with the interrelationship existing among tests of the same type or class, viz. attitude, values, and cognitive measures. In addition, we are interested in studying the relationship among attitude, value, and cognitive measures.

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[1] The r's obtained between the Test of Critical Thinking and the MSU Reading Test are of a slightly higher order in the present study. Some of these differences may be accounted for, in part at least, by the fact that a revised form of the Reading Test was used in the present study.

The intercorrelations of the attitude, value, critical thinking, and aptitude measures are presented in Table 27. From the data presented, it is readily evident that for both males and females there is no significant relationship between traditional values and measures of stereotypy, critical thinking ability, verbal comprehension and general academic aptitude. Both the IB and D-Scale 1 exhibit significant relationship with the test of critical thinking and the cognitive measures of reading and general aptitude. This agrees with the findings of Plant (55) concerning the relationship between dogmatism and intelligence. The relationship between the CQT and both the IB and Dogmatism scale suggests that a general factor of general aptitude is operating. Factors found in reading and general ability tests are operating in the IB and Dogmatism scales to a significant degree while they are nearly non-existent in most of the Differential Values Inventory subscales. This may be interpreted as indicating a reading and general academic aptitude factor in dogmatism and stereotypy tests. The nature of these factors remains unclear at this time although their presence should be considered by investigators employing these instruments. On the other hand, these factors do not appear to be operating in the rigidity measure.

For the most part, both the traditional and emergent sub-scales are unrelated to our attitude, value, and aptitude measures. Some exceptions to be noted are as follows:

1. A very small but statistically significant relationship (for males, females, and the total population) exists between the
    - (a) Individualism scale and the IB and test of critical thinking.
    - (b) Relativism scale and IB.
    - (c) Dogmatism scale and all the scales of the DVI except Individualism and Conformity. Sociability, Relativism, and Present-Time Orientation are negatively correlated with dogmatism.
    - (d) Reading test and both Individualism and Conformity*

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* Negative correlation

(e) Verbal portion of the CQT and Individualism, Puritan Morality, and Conformity.*

(f) Information portion of the CQT and Individualism.

(g) Numerical portion of the CQT and both Individualism and Work-Success.

(h) Total CQT score and Individualism and Conformity.*

In the majority of cases, the correlations for males are higher than those for females. Whether this is a reflection on the inherent qualities of the instruments or significant sex differences is, at this time, purely a matter of conjecture.

Summary

In general, the instruments of the general test battery[1] show the expected interrelationships. Although there are slight differences between the test interrelationship of this study and those reported elsewhere (15, 66, 83, 84), there is more agreement than disagreement. Tests, however, which one might assign to a particular class such as attitudes or values, do not always show significant interrelationships. Consider, for example, the Inventory of Beliefs, the Dogmatism Scale and Wesley's Rigidity Scale. Since these tests measure such dimensions as stereotypy, dogmatism, and rigidity respectively, one might consider that these tests are measuring comparable traits. Our data, however, indicate that the IB and Dogmatism scale can be grouped together, but the rigidity measure must be treated separately.

The test interrelationships considered and reported here did not deal with the interrelationship existing among academic achievement in specific courses or in grade-point average and traits of stereotype, dogmatism, and traditional values. This point will be discussed in the next section of the report.

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* Negative correlation

[1] The general battery consisted of the Inventory of Beliefs, Form I; Test of Critical Thinking, Form G; Rokeach's Dogmatism Scale, Form E; MSU Reading Test; Prince's Differential Values Inventory; and the College Qualifications Test.

HYPOTHESIS III: THE RELATIONSHIP BETWEEN SELECTED COGNITIVE AND AFFECTIVE VARIABLES TO FRESHMAN STUDENT WITHDRAWAL FROM COLLEGE

Hypothesis 3 states that there is some difference in critical thinking ability, attitudes of stereotypy and dogmatism, traditional values, reading ability, academic aptitude, and parental socio-economic-educational status between those Michigan State University freshman students who completed the freshman year of academic study and those freshman students who withdrew from college during the freshman year.[1]

The investigation of the above hypothesis is important for two major reasons. First, the study should supplement existing knowledge concerning the nature of the freshman college student who terminates his college attendance prior to the completion of the first year. Several investigators have contributed to the current knowledge regarding the relationship between collegiate persistence and academic aptitude variables. The findings in this research effort should supplement and confirm many of these findings.

The second major reason for the importance of such an investigation is to attempt to learn more regarding the relationship of attitudes and values to collegiate persistence. Comparatively little research has been conducted in this area and many of the findings which are currently available are not consistent.

All those students who withdrew from college sometime during the first year of study were placed in the withdrawal group. Three hundred and three students (or 11 per cent) from the original sample of 2,746 students withdrew from MSU sometime during their freshman year. Of the 303 students, 58 per cent were males and 42 per cent were females.

A control group of 250 students was randomly drawn from the remaining 2,443 students who did not withdraw from MSU during the freshman year. This group of 250 students constituted an approximate 10 per cent sample of those who remained in college.

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[1] For the remaining portion of this report, those students who withdrew from college sometime during the freshman year will be termed "withdrawals" and those students who remained in college through the end of the freshman year will be called "enrollees".

Data were assembled for students in the control group (those who remained) and for the experimental group (those who withdrew). The raw scores on the Inventory of Beliefs, Test of Critical Thinking, Differential Values Inventory, Rokeach's Dogmatism Scale, MSU Reading Test, and College Qualification Test were used.

In addition, a measure of social class was developed. Previous research has indicated that the occupation of the father and educational level of the father and mother are related to college student withdrawal. These three variables were combined into a single index of socio-economic-educational status.[1]

A two by two analysis of variance for unequal frequencies design was used to analyze the data. The results of the analysis will be discussed according to the following areas: (1) cognitive variables, and (2) attitude, value and social class variables.

Cognitive Variables

Test of Critical Thinking. A significant difference was found between enrollees and withdrawals on the Test of Critical Thinking. Those students who remained in college through the end of the freshman year had higher mean scores (32.44) on the Test of Critical Thinking than did those students who withdrew (27.83). No significant sex difference was found, nor was the interaction between sex and collegiate persistence found to be statistically significant. Tables 30 and 31 present the findings in greater detail.

TABLE 30

Mean Critical Thinking Scores

	Males	Females	Total
Withdrawn	$\bar{X} = 28.03$ N = 176	$\bar{X} = 27.54$ N = 127	$\bar{X} = 27.83$ N = 303
Enrolled	$\bar{X} = 33.20$ N = 137	$\bar{X} = 31.52$ N = 113	$\bar{X} = 32.44$ N = 250
Total	$\bar{X} = 30.29$ N = 313	$\bar{X} = 29.42$ N = 240	

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[1] See the appendix for a brief statement of the methodology involved in the formation of the socio-economic-educational index score.

TABLE 31

Analysis of Variance of Test of Critical Thinking Scores

Source of Variation	Sum of Squares	d.f.	Mean Square	F
Collegiate Persistence*	20.93	1	20.93	53.94**
Sex	1.18	1	1.18	3.04
Interaction	.35	1	.35	.90
Within Groups		549	.38	

* Enrollees vs. Withdrawals

** Significant beyond the .05 level of confidence.

Reading. The MSU Reading Test cores were analyzed according to the aforementioned model. The findings indicate a significant difference in reading ability between those students who withdraw from college and those students who remain through the end of the freshman year. The mean reading test score for those who withdrew was 24.34, while the mean score for those enrolled was 28.30. This difference is significant beyond the .05 level of confidence. Tables 32 and 33 present the group means and the analysis of variance data.

Neither the sex nor interaction terms were significant.

TABLE 32

Mean Scores on the MSU Reading Test

	Males	Females	Total
Withdrawals	$\bar{X} = 23.86$ N = 176	$\bar{X} = 25.01$ N = 127	$\bar{X} = 24.34$ N = 303
Enrollees	$\bar{X} = 28.43$ N = 137	$\bar{X} = 28.14$ N = 113	$\bar{X} = 28.30$ N = 250
Total	$\bar{X} = 25.86$ N = 313	$\bar{X} = 26.48$ N = 240	

TABLE 33

Analysis of Variance of MSU Reading Test Scores

Source of Variation	Sum of Squares	d.f.	Mean Square	F
Collegiate Persistence	14.82	1	14.82	46.02*
Sex	.18	1	.18	.56
Interaction	.52	1	.52	1.61
Within Groups		549	.32	

* Significant beyond the .05 level of confidence.

College Qualification Test. A significant difference was found between students enrolled at the end of the freshman year and students who withdrew during the year on the College Qualification Test, a measure of academic aptitude. The mean CQT score for those enrolled was 123.46, while for those who withdrew, the CQT mean score was 108.64. This difference in academic aptitude was significant beyond the .05 level of confidence.

In addition, males in the sample have a significantly higher mean CQT score than females. The mean for males (withdrawals and enrollees) was 119.92, while for females the mean CQT score was 109.38. Interaction was not significant.

Tables 34 and 35 present the group means and the analysis of variance on the College Qualification Test.

TABLE 34

Means of Groups on College Qualification Tests

	Males	Females	Total
Withdrawn	$\bar{X} = 112.28$ N = 176	$\bar{X} = 103.60$ N = 127	$\bar{X} = 108.64$ N = 303
Enrolled	$\bar{X} = 129.72$ N = 137	$\bar{X} = 115.87$ N = 113	$\bar{X} = 123.46$ N = 250
Total	$\bar{X} = 119.92$ N = 313	$\bar{X} = 109.38$ N = 240	

TABLE 35

Analysis of Variance for College Qualification Test

Source of Variation	Sum of Squares	d.f.	Mean Square	F
Collegiate Persistence	220.67	1	220.67	47.56*
Sex	126.90	1	126.90	27.35*
Interaction	6.69	1	6.69	1.44
Within Groups		549	4.64	

* Significant beyond .05 level of confidence

Summary of Cognitive Variables. The findings of this study relative to the relationship of various cognitive variables to freshman college student withdrawal indicate a positive relationship between critical thinking ability, reading ability, and academic aptitude and student withdrawal during the freshman year. Students who did not withdraw from college during the freshman year may be characterized (as a group) as being better readers, having greater ability to think critically, and evidencing more scholastic or academic aptitude than those students who withdrew during their freshman year.

These findings are in general agreement with those of Iffert (34) who found a relationship between collegiate persistence and the variables of high school rank and standing on the college placement tests. Yoshino (81) and Smith (69) also present findings which are in close agreement. Both found that those who withdrew from college had lower mean scores on the American Council on Education's Psychological Examination.

The findings of this report, in addition to the findings of Iffert (34), Smith (70), Yoshino (81), Bragg (4), Linns and Pitt (46), Slocum (67), Goble (23), and Hanks (28) support the generalization that those students who withdrew from college have less aptitude for college level work, both in reference to academic aptitude as measured by the College Qualification Test or the A.C.E., and to those specific academic skills or aptitudes necessary for college work, such as critical thinking ability and reading ability.

Attitudes, Values and Social Class

Inventory of Beliefs. Through the use of a two by two analysis of variance design, a test of differences in Inventory of Belief mean scores between those who withdrew from college and those who remained through the end of the freshman year was made. The findings indicate a statistically significant difference between the Inventory of Beliefs means of withdrawals and enrollees. The mean of those students who withdrew from college was 60.38, while the IB mean for those remaining in college was 63.52. This difference is significant at the .05 level of confidence.

Thus, it would be possible to infer that those who withdrew from college were slightly more stereotypic in their beliefs than those who remained in college. A conflict between the fixed, stereotypic belief system of this group of students, and the campus culture of which they were a part, may have contributed in some small measure to the subsequent withdrawal of these students from college.

Some caution should be excercised in the interpretation of these findings. Although group differences were statistically significant, they were also small. Moreover, for this group of 553 students, the Inventory of Beliefs correlates .29 with the Test of Critical Thinking, .29 with MSU Reading, and .27 with CQT total score. The question must then be logically raised as to the possible influence of these cognitive measures on the apparent difference between withdrawals and enrollees on the measure of stereotypy, the Inventory of Beliefs.

A more extensive analysis of withdrawal from college is in progress (using the technique of discriminant analysis) to characterize students who withdrew from college and students who remained enrolled in relationship to the instruments used. Through the use of discriminant analysis, a tentative answer to the question raised above should be available.

The differences between the male and female Inventory of Belief scores were not significant, nor was the interaction term significant. Tables 36 and 37 present the group means and the analysis of variance data for the Inventory of Beliefs.

TABLE 36

Group Means on Inventory of Beliefs

	Males	Females	Total
Withdrawal	$\bar{X}$ = 59.57 N = 176	$\bar{X}$ = 61.50 N = 127	$\bar{X}$ = 60.38 N = 303
Enrollee	$\bar{X}$ = 62.88 N = 137	$\bar{X}$ = 64.28 N = 113	$\bar{X}$ = 63.52 N = 250
Total	$\bar{X}$ = 61.02 N = 313	$\bar{X}$ = 62.81 N = 240	

TABLE 37

Analysis of Variance for Inventory of Beliefs

Source of Variation	Sum of Squares	d.f.	Mean Square	F
Collegiate Persistence	9.27	1	9.27	6.67*
Sex	2.77	1	2.77	1.99
Interaction	.08	1	.08	.058
Within Groups		549	1.39	

*Significant at the .05 level of confidence.

Rokeach's Dogmatism Scale. The theoretical scheme of Rokeach's Dogmatism scale is similar to that of the Inventory of Beliefs. This claim to commonality is supported by a correlation coefficient between Rokeach's Dogmatism and Inventory of Beliefs scores of .59. It should be pointed out, however, that while we would theoretically expect the concepts to be interrelated, it is also possible to make a distinction between dogmatism and stereotypy. Thus, the correlation coefficient of .59 would accommodate this assumed distinction.

There was no significant difference in the mean dogmatism scores between withdrawals and enrollees. Moreover, there was no significant difference between the sexes on this measure, nor was the interaction significant.

Thus, we fail to reject the null hypothesis that there is no difference between withdrawals and enrollees in the attitude of dogmatism. Tables 38 and 39 present the group means and the analysis of variance data.

TABLE 38

Group Means on Rokeach's Dogmatism Scale*

	Males	Females	Total
Withdrawals	$\bar{X}$= 169.91 N= 176	$\bar{X}$= 169.06 N= 127	$\bar{X}$= 169.55 N= 303
Enrollees	$\bar{X}$= 166.57 N= 137	$\bar{X}$= 161.35 N= 113	$\bar{X}$= 164.22 N= 250
Total	$\bar{X}$= 168.45 N= 313	$\bar{X}$= 165.43 N= 240	

*Higher scores indicate more dogmatism.

TABLE 39

Analysis of Variance of Rokeach's Dogmatism Scale

Source of Variation	Sum of Squares	d.f.	Mean Square	F
Collegiate Persistence	30.53	1	30.53	2.62
Sex	9.21	1	9.21	.79
Interaction	4.77	1	4.77	.41
Within Groups		549	11.65	

The Differential Values Inventory. No significant difference was found in the mean D-V Inventory traditional scores between those students who withdrew during their freshman year and those who completed their freshman year. A significant sex difference was found, however, with the males in the sample having a mean D-V Inventory score of 34.85 and females 32.94. Interaction was not significant.

Thus, while females tend to be more emergent in their value system than males (values of sociability, conformity, relativism, and present time orientation), these values do not appear to be related to collegiate withdrawal. Analysis of variance data and group means are presented in Tables 40 and 41.

TABLE 40

Group means on the Differential Values Inventory

	Males	Females	Total
Withdrawals	$\overline{X}$ = 34.25 N = 176	$\overline{X}$ = 33.27 N = 127	$\overline{X}$ = 33.84 N = 303
Enrollees	$\overline{X}$ = 35.61 N = 137	$\overline{X}$ = 32.57 N = 113	$\overline{X}$ = 34.24 N = 250
Total	$\overline{X}$ = 34.85 N = 313	$\overline{X}$ = 32.94 N = 240	

TABLE 41

Analysis of Variance of Differential Values Inventory

Source of Variation	Sum of Squares	d.f.	Mean Squares	F
Collegiate Persistance	.11	1	.11	.11
Sex	4.05	1	4.05	4.33*
Interaction	1.06	1	1.06	1.13
Within Groups		549	.936	

*Significant at the .05 level of confidence.

Socio-economic-education Index. A significant difference in mean socio-economic-educational index scores was found between those students who remained enrolled in college and those who withdrew during the freshman year. The mean socio-economic-educational index score for those who withdrew was 55.77, while for those who remained in college, the mean socio-economic-educational index score was 64.06. This finding would indicate that those students who withdrew from college during the freshman year come from a home background of a lower social-economic-educational level than did those students who remained in college through the end of the freshman year.

Sex differences in socio-economic-educational index scores were also significant beyond the .05 level of confidence. Females had a socio-economic index score of 62.39, while the male mean was 56.90. Interaction was not significant.

Tables 42 and 43 contain a more detailed description of the findings.

TABLE 42

Group Means on Socio-economic-educational Index

	Males	Females	Total
Withdrawals	$\bar{X}$= 53.47 N= 176	$\bar{X}$= 58.96 N= 127	$\bar{X}$= 55.77 N= 303
Enrollees	$\bar{X}$= 61.51 N= 137	$\bar{X}$= 67.14 N= 113	$\bar{X}$= 64.06 N= 250
Total	$\bar{X}$= 56.99 N= 313	$\bar{X}$= 62.81 N= 240	

TABLE 43

Analysis of Variance of Socio-economic-educational Index

Source of Variation	Sum of Squares	d.f.	Mean Squares	F
Collegiate Persistence	65.77	1	65.77	44.14*
Sex	30.91	1	30.91	20.74*
Interaction	.01	1	.01	.007
Within Groups		549	1.49	

*Significant beyond the .05 level of confidence.

The meaning to be derived from differences in socio-economic-educational status level are partially open to specultaion. In this instance however, three possible meanings might be suggested for consideration.

It is possible that some might interpret the relationship between parental socio-economic-educational status level to withdrawal from college during the freshman year as evidence of financial need of certain students. While this may be partially true in some few instances, it is also likely that the socio-economic-educational index is measuring factors beyond parental income or financial status. Moreover, there is some question as to which stages of the college attendance provide the greatest drain on financial resources of students. It is possible that the effects of financial inadequacy would be felt more directly at the end of the freshman year and/or during or at the end of the sophomore year, rather than during the very first year in college.

A second interpretation advanced by some might be that the socio-economic-educational index is an indirect measure of parental ability, and thus, students from higher socio-economic-educational status level homes could be expected to have more academic aptitude.

Some evidence is available to indicate that such is not the case. The socio-economic-educational index correlates .16 with the College Qualification Test, .13 with Critical Thinking and .15 with reading. While these correlation coefficients are statistically significant, they are low enough to indicate that the socio-economic-educational index is relatively independent of general academic aptitude measures.

The third possible interpretation, and the interpretation most acceptable to the research staff, is that the socio-economic-educational index scores reflect in an indirect manner, values toward formal education. There are possibly several factors operating which tend to cause persons of different social class levels to view the education process differently, and place differing values on college attendance.

Without extensively developing a social theory, it could be stated that the lower occupational aspirations of the lower social classes (27), the social norm of college attendance for upper and upper-middle class youths (32), and the resulting "value support" from parents and peers for college attendance contribute toward a value system which places considerable emphasis on college attendance for middle and upper class youths.

Certainly the picture is more detailed and complex. But, it may be simply stated that college attendance and persistance reflects a value on such an act as being both socially and personally important. Thus, those students who withdrew from college may have placed somewhat less value on college attendance and/or received less value support for college attendance than those students who remained in college.

2

Summary

The results of the study of student withdrawal from college at the end of the freshman year at Michigan State University may be summarized in the following statements*

1. Those students who withdrew from college during the freshman year had less ability to think critically than did those students who remained in college through the end of the freshman year.

2. Those students who withdrew from college were not as proficient in reading ability as those students who remained in college through the end of the freshman year.

3. Those students who withdrew from college had less academic aptitude than those students who remained in college through the end of the freshman year.

4. On the basis of differences in Inventory of Beliefs scores, students who withdrew from college during the freshman year appear more stereotypic in their beliefs than do those students who remain in college through the end of the freshman year.

5. There is no significant difference between those students who withdraw from college and those who remain through the end of the freshman year in relation to amounts of dogmatism as measured by Rokeach's Dogmatism Scale.

6. There is no significant difference between those students enrolled and those who withdrew from college by the end of the freshman year in the extent to which they hold the traditional values of work success, puritan morality, individualism, and future-time orientation.

7. Those students who withdrew from college during the freshman year were from a lower parental socio-economic-education level than were those students who remained in college through the end of the freshman year. This difference was interpreted to indicate a difference in the values of withdrawals and enrollees toward college attendance.

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* Unless stated otherwise, the differences are significant beyond the .05 level of confidence.

HYPOTHESIS IV: THE RELATIONSHIP OF SELECTED COGNITIVE AND AFFECTIVE VARIABLES TO STUDENT PERFORMANCE IN NATURAL SCIENCE AND COMMUNICATION SKILLS, FALL, WINTER, AND SPRING TERMS, 1958-59

Of continuing interest to all educators is the study of various student characteristics in relationship to academic performance or learning. Instruction, or dissemination of knowledge, is one of the main responsibilities of any institution of higher learning. Increased understanding of the factors which contribute toward student learning, and those factors which retard this process has resulted in improvement of the effectiveness of instruction, the refinement of admissions programs, and has improved the counseling services available to students.

Three random samples consisting of 400 students each (208 males and 192 females) were drawn in order to study the relationship of the various cognitive and affective variables to academic performance in the two freshman General Education courses and over-all freshman academic performance.

Data were gathered each term on the following Basic College courses:

A. Communications Skills

1.) Instructor Grade

2.) Exam Grade

3.) Total Grade in course

B. Natural Science

1.) Instructor Grade

2.) Exam Grade

3.) Total Grade in course[1]

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[1] Grades in Communication Skills and Natural Science are initially awarded on a point basis. The instructor assigns a point grade for each student ranging from 1 to 15 points, the specific value of which is assigned relative to performance on class quizzes, assignments, and participation in class. The examination grade is assigned solely on the basis of the term-end examination common to all students and sections of the course. The in-

C. The term grade point average[2]

The raw scores on the instruments of the general battery previously mentioned were correlated with the instructor grade, exam grade, and total grade received each term in the communication skills and natural science general education courses. The term grade point average was also correlated with the test variables.

Tables 44 through 49 report the relationship between the various test variables and instructor, exam, and total grades in Natural Science and Communication Skills. Also reported are relationships between the test variables and term grade point averages (G.P.A.)[3].

TABLE 44

Correlations Between Inventory of Beliefs Scores and Academic Performance

	Males (N= 202)			Females (N = 198)		
	Fall	Winter	Spring	Fall	Winter	Spring
Communication Skills						
Instructor grade	.11	.13	.10	.19	.22	-.06
Exam grade	.32	.31	.29	.29	.21	.08
Total Course grade	.27	.26	.25	.28	.25	.04
Natural Science						
Instructor grade	.20	.27	.14	.10	.13	.11
Exam grade	.18	.32	.10	.14	.20	.16
Total course grade	.21	.33	.14	.13	.18	.15
Term G.P.A.	.16	.27	.15	.22	.17	.12

Note -- For N= 200, a correlation of .14 is significant at the .05 level, of .18 at the .01 level.

Inventory of Beliefs

Several interesting observations can be made from the data in Table 44 regarding

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structor grade and the examination are combined, each contributing 50 per cent, to form the total grade in the course. For purposes of reporting grades to students, point values are translated to letter grades of A, B, C, D, and F.

[2] A letter grade of A, B, C, D, or F is usually reported for each course taken. The term grade point average is determined by translating letter grades to point values (A=4, B=3 C=2, D=1, F=0) and these point values are multiplied by the credit hour value of the respective course. The sum of these resulting points is obtained and divided by the total number of credits carried. The final computation yields a grade point average (e.g. 2.60=C+).

the relationship between stereotypy (Inventory of Beliefs scores) and academic performance. First, the generalization can be made that there is a relationship for both males and females between I.B. scores and instructor, exam, and total grades in Natural Science and Communication Skills all three terms (except for one marked exception).[3] Although these relationships are slight (highest correlation coefficient is .33) they are generally consistent and indicate that students who are less stereotypic in beliefs tend to receive higher instructor, exam, and total grades in the two basic courses.

The exception mentioned above makes reference to the low relationship between Inventory of Beliefs scores and Communication Skills grades, for females, in the spring term. The relationship between Communication Skills grades and I.B. for females in this term can be considered essentially zero.

Although it is natural to question why this deviation from the general pattern should occur only in third term of Communication Skills, and only to females, no explanation is available.

One possibility relates to the dynamics of the third term course in Communication Skills. We know that some students (twice as many females as males) accelerate and do not attend the third term classes. Approximately 7 per cent of the females accelerated third term. Moreover, considerable emphsis in the third term of Communication Skills is placed upon critical reasoning, problem solving, ethical standards of communication, persuasion, and objectivity.

These two factors, (acceleration and course content) may operate to reduce the range of stereotypy in the group. The high group may accelerate and those with low scores may have more to "learn" from the course. Thus if the range of Inventory of Beliefs scores were reduced, and the range of grades remained approximately the same, a reduction in the correlation would result.

Further study may yield data to support or reject the hypothetical explanations suggested above.

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[3] The Tables pertaining to Hypothesis IV are included in the text.

It is interesting to note that the relationship between stereotypy and instructor grades in Communication Skills tends to be slightly higher for females than for males. In natural science, however, the relationship between stereotypy and grades appears higher for males than for females.

Again, the meaning of such an apparent trend is not clear. Differences may be due to chance. On the other hand, however, it is possible that factors of course content and culturally determined behavioral differences between males and females may combine to produce such differences. For example, if males were more "open" in the expression of attitudes of stereotypy than females, the expression of these attitudes might be received differently in communication skills than in natural science courses. Such a difference could be reflected in instructor grades, and account, in part for observed differences in correlation coefficients.

The significance of the relationship of stereotypy to college grades is difficult to state with any clarity. First, it should be emphasized that the relationship which does exist is not strong (i.e., we would not attempt to use the Inventory of Beliefs for selection, admission, or placement purposes).

On the other hand, there is definitely a low positive relationship between grades and Inventory of Beliefs scores. Further study may well lend more insight into the meaning of the relationship, but some tentative meanings can be suggested.

It may be that I.B. scores represent not only a measure of stereotypy, but also an indirect measure of the attitudes or habits which contribute toward the formation of stereotypic beliefs. An open, questioning mind, or a person who is hesitant to accept a conviction without some evidence or fact, is likely to be less stereotypic.

Moreover, research has indicated that persons who have had direct and close contact with the groups or ideas are less willing to offer stereotypic descriptions of the particular groups or ideas. Thus, stereotypy may also reflect the nature and/or breadth of previous experiences.

These factors, in addition to the flexible, non-conformist element in stereotypy, may offer some clues to further investigation.

Rokeach's Dogmatism Scale

Table 45 shows that the relationship between dogmatism and instructor grades tends to be lower than that between stereotypy and instructor grades.

TABLE 45

Relationships Between Dogmatism and Academic Performance

	Males (N = 202)			Females (N = 198)		
	Fall	Winter	Spring	Fall	Winter	Spring
Communication Skills						
Instructor grade	-.07	-.09	-.03	-.07	-.05	-.05
Exam grade	-.23	-.27	-.20	-.20	-.15	-.08
Total course	-.19	-.22	-.15	-.17	-.13	-.08
Natural Science						
Instructor Grade	-.17	-.21	-.21	-.05	.00	-.11
Exam grade	-.16	-.29	-.13	-.14	-.07	-.22
Total course grade	-.18	-.28	-.20	-.09	-.04	-.19
Term G.P.A.	-.15	-.22	-.16	-.15	-.05	-.12

Note -- For N = 200, a correlation of .14 is significant at the .05 level, of .18 at the .01 level.

The relationship between examination grades and dogmatism is significant, indicating that the less dogmatic individuals tend to make higher examination grades. In communication skills, the relationship between dogmatism and instructor grade for both sexes is not significant, and can be considered essentially zero.

It is interesting to observe that while no apparent relationship exists between dogmatism and Natural Science instructor grades for females, a significant relationship is indicated for males. These data tend to support the findings relating to stereotypy and course grades. The question is still present as to why the relationship between stereotypy and dogmatism and instructor grades in natural science is greater for males than for females.

Other questions to be examined subsequently include the following: (1) If the concepts of dogmatism and stereotypy are theoretically related, why do we find a stonger relationship between instructor grades and stereotypy than between instructor grades and dogmatism? (2) Why do examination grades in communication skills and natural science appear to be more closely related to stereotypy and dogmatism than instructor grades? (3) What relationship is there between attendance in a natural science and/or a communication skills course (s) and changes in attitudes of stereotypy and dogmatism? These and additional questions will be examined in subsequent phases of the study.

Differential Values Inventory

An examination of Table 46 reveals no consistent pattern in relationship between traditional value orientation and grades in natural science and communication skills courses.

TABLE 46

Correlations Between Differential Values Inventory Scores and Academic Performance

	Males (N = 202)			Females (N = 198)		
	Fall	Winter	Spring	Fall	Winter	Spring
Communication Skills						
Instructor grade	.05	.12	.18	.00	.06	-.05
Exam grade	.03	.12	.06	.06	.12	-.03
Total course grade	.05	.14	.13	.04	.11	-.03
Natural Science						
Instructor grade	.10	.07	.00	.16	.12	.04
Exam grade	.02	.13	.03	.16	.10	-.07
Total course grade	.06	.12	.01	.17	.11	-.01
Term G.P.A.	.11	.13	.03	.16	.07	.04

Note -- For N = 200, a correlation of .14 is significant at the .05 level, of .18 at the .01 level.

Although some differences do stand out, they appear to be more related to the sample or to the group studied than to the course characteristics. That is, variation seems greater between terms than between courses or grade sources (instructor, examination).

Moreover, the relationship between traditional values and academic aptitude for the total sample (N=2,746) is essentially zero (r .05). Due to chance, however, some of the samples selected for the study of the relationship between course grades and D-V traditional scores show a slightly higher correlation between D-V traditional scores and C.Q.T. scores than was found for the total freshman sample. These chance relationships in turn, appear to correspond (roughly) to the variations in correlation coefficients between traditional values and course grades.

A further examination of the relationship between traditional values and course grades (removing the effect of academic aptitude), would offer a more confident statement as to the meaning of the current findings. Taken at face value, those students with more traditional value systems (work success, individualism, puritan morality, and future time orientation) seem to have a slight tendency to make better grades than those with more emergent value systems.

COGNITIVE VARIABLES

Critical Thinking, Reading Ability, and Academic Aptitude

Table 47 presents the correlation coefficients between Critical Thinking test scores and grades in natural science and communication skills courses.

It is interesting to note the high correlation between critical thinking ability and Fall term instructor grades in natural science. There is, however, a sharp drop in correlation magnitude (instructor grades with critical thinking) for the second and third terms of the course. We find no such large drop in the magnitude of correlation coefficients in communication skills instructor grades and critical thinking ability. Thus, with the exception of the first term of natural science, the relationships of critical thinking ability to instructor grades in natural science and communication skills courses are much the same.

TABLE 47

Correlations Between Critical Thinking Scores and Academic Performance

	Males (N = 202)			Females (N = 198)		
	Fall	Winter	Spring	Fall	Winter	Spring
Communication Skills						
Instructor grade	.29	.23	.19	.14	.28	.25
Exam grade	.51	.46	.38	.49	.47	.40
Total course grade	.49	.42	.35	.39	.45	.39
Natural Science						
Instructor grade	.50	.28	.17	.51	.29	.31
Exam grade	.49	.41	.36	.56	.51	.46
Total course grade	.54	.39	.31	.57	.44	.44
Term G.P.A.	.48	.37	.21	.45	.37	.34

Note -- For N = 200, a correlation of .14 is significant at the .05 level, of .18 at the .01 level.

To find meaning in this pattern, one must remember that the measure of critical thinking ability was taken prior to the opening of classes in the fall. Any subsequent gains in the ability to think critically would not be accurately reflected in the scores used in this analysis (fall 1958 scores). Thus, we can account for the gradual lowering of the correlation between critical thinking ability and the two course grades (instructor, exam, and total). It is possible that those students who were initially low in critical thinking ability increase in this skill; the initial "advantage" of those who were high in critical thinking ability is decreased.

The Natural Science course is concerned with the scientific reasoning process in addition to subject-matter emphasis. One objective of the course is to require the student to employ the methods of science in dealing with subject matter concepts and facts with the end of giving the student some understanding of the "scientist's thinking process". The first term of the course may be particularly suited to this objective through the study of reporduction and cell theory.

This background is given as support for the hypothesis that greatest gains in critical thinking ability occur during the first term of natural science. While some gain in critical thinking ability is probably made each term of natural science, the pattern evident in the correlation coefficients would indicate that the largest gain may occur during the first term.

The data in Table 47 also indicate that there is a higher correlation between critical thinking ability and examination grades than between critical thinking ability and instructor grades. With the exception of first term natural science, the correlation between examination grades and critical thinking ability is higher than the correlation between instructor grades and critical thinking ability.

The generalization can be made that, according to the findings of this study, the ability to think critically is significantly related to academic success (grades) in college during the freshman year. That the correlations tend to decrease term by term may be indicative of changes in students' initial status on the test which in turn tends to make the initial measure of critical thinking ability a less precise statement of the students' current status in critical thinking ability.

Reading Ability

The relationships between reading ability and course grades are presented in Table 48.

Several trends are apparent. First, reading ability correlates higher with examination grades than with instructor grades, as one would anticipate. It is interesting to note, however, that communication skills examination grades correlate somewhat higher with reading scores than do natural science examination grades. This finding may reflect the additional emphasis placed on the ability to read and interpret materials in the communication skills examinations.

Another interesting observation is that (for both males and females) correlations between reading ability and communication skills instructor grades remain fairly constant. There is, however, a slight tendency for both communication skills and natural science examination grades to correlate higher with reading ability in the first term than in the second or third. This phenomenon could be explained on the basis of increases in reading ability over the year by those who were initially low.

TABLE 48

Correlations Between Reading Ability Scores and Academic Performance

	Males (N = 202)			Females (N = 198)		
	Fall	Winter	Spring	Fall	Winter	Spring
Communication Skills						
Instructor grade	.38	.34	.34	.33	.35	.32
Exam grade	.67	.62	.58	.67	.48	.59
Total course grade	.65	.58	.56	.60	.49	.55
Natural Science						
Instructor grade	.54	.37	.17	.47	.28	.29
Exam grade	.55	.52	.43	.49	.51	.55
Total course grade	.60	.50	.35	.52	.44	.48
Term G.P.A.	.57	.48	.36	.52	.34	.46

Note - For N = 200, a correlation of .14 is significant at the .05 level, of .18 at the .01 level.

The rather sharp drops from term to term in the magnitude of the correlation coefficient between natural science instructor grades and reading ability is also apparent from Table 48. Although the amount of reading required in natural science courses is less than that in other Basic College courses[1]; the relationship between reading ability and instructor grades is high in the first term. This may reflect the ability to read in all courses, and not merely natural science. A poor reader would require more time and effort in the preparation for courses other than natural science and thus would have less time to spend in preparation for natural science class. This factor, combined with the necessity for some reading ability in the natural science course, in addition to the relationship between the ability to read and past academic performance (achievement) may result in a higher correlation between instructor grades in natural science and reading ability. Increases in the ability to read, and greater academic adjustment as the year progresses may serve to lower the correlation between the initial measurement of reading ability and natural science instructor grades.

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[1] Communication Skills, Social Science and Humanities. The latter two are normally taken in the sophomore year.

It would appear that reading ability is definitely related to general scholastic performance. Caution should be observed, however, in attempting to use reading scores for counseling, predictive or selective purposes. Students may, in general, reasonably be expected to improve in reading skills during college. Thus, the time interval between the measurement of reading skill and the use of the measurement for counseling, predictive, or selective purposes should be considered.

College Qualification Test

The College Qualification Test was designed specifically to assist in the prediction of collegiate performance. The C.Q.T. is used by colleges in admission, placement, and guidance procedures. Thus, we would expect that the C.Q.T. total and sub-test scores would correlate significantly with performance in communication skills, natural science, and total term grade point averages.

The C.Q.T. and Communication Skills: Table 49 presents the correlation coefficients between the C.Q.T. scales (Verbal, Information, Numerical, and total scores) and performance in natural science, communication skills, and total term grade point average.

It is apparent upon examination of Table 49, and reference to Table 48, that the predictive ability of the M.S.U. Reading test, and the Verbal and Total scores of the C.Q.T. are markedly similar. This is understandable, both in terms of some of the basic skills or aptitudes required for academic success and in terms of the high intercorrelation between the three scores.[1]

The information and numerical sections of the C.Q.T. present a somewhat different

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[1] The verbal score of the C.Q.T. is combined with the numerical and informational scores to form the total score. Thus, a high forced inter test correlation would be ex pected. The M.S.U. Reading test correlates highly (.67 and .71) with both the verbal and the total C.Q.T. scores.

TABLE 49

Correlations Between the College Qualifications Test Scores and Academic Performance

	Males(N=202)									Females(N=198)								
	Fall			Winter			Spring			Fall			Winter			Spring		
	Inst.	Ex.	Total	Inst.	Ex.	Tot.	Inst.	Ex.	Tot.	Inst.	Ex.	Tot.	Inst.	Ex.	Tot.	Inst.	Ex.	Tot.
Comm. Skills																		
CQT-V	.32	.69	.63	.45	.53	.58	.31	.48	.48	.28	.70	.60	.42	.52	.56	.26	.56	.50
CQT-I	.35	.62	.60	.24	.43	.40	.12	.33	.28	.29	.57	.52	.29	.49	.48	.23	.42	.39
CQT-N	.17	.33	.31	.13	.34	.29	.05	.15	.12	.13	.27	.24	.22	.40	.38	.18	.22	.24
CQT-Tot	.36	.71	.66	.38	.58	.57	.24	.46	.43	.31	.68	.60	.42	.61	.61	.30	.55	.51
Nat. Science																		
CQT-V	.36	.43	.44	.36	.41	.44	-.05	.17	.06	.34	.40	.40	.26	.38	.35	.06	.31	.22
CQT-I	.50	.54	.57	.41	.45	.48	.16	.47	.37	.49	.46	.51	.40	.58	.54	.27	.54	.47
CQT-N	.45	.44	.49	.35	.29	.36	.38	.49	.49	.54	.51	.57	.25	.44	.38	.34	.48	.46
CQT-Tot	.53	.58	.61	.48	.50	.55	.19	.48	.38	.59	.59	.64	.36	.57	.51	.28	.57	.49

	Males(N=202)			Females(N=198)		
	Fall G.P.A.	Winter G.P.A.	Spring G.P.A.	Fall G.P.A.	Winter G.P.A.	Spring G.P.A.
CQT-V	.44	.46	.20	.40	.34	.23
CQT-I	.56	.37	.32	.47	.41	.33
CQT-N	.45	.34	.24	.44	.27	.29
CQT-Total	.60	.51	.34	.57	.41	.37

pattern. We find that correlations between C.Q.T. numerical ability and communication skills grades are rather low. This would be anticipated as one examines the content of the communication skills course.

Also, it is apparent that for males, the relationship between C.Q.T. numerical score and communication skills grades decreases term by term to the point at which in the third or Spring term, it is of little practical significance. The same trend, however, is not present in females, and the relationship between the numerical score and communication skills grades remains fairly low, but constant.

This same kind of pattern is evident in the relationship between the information section of the C.Q.T. and communication skills grades. While correlations for males between C.Q.T. information and grades are rather high in the fall term, the magnitude of the correlations decrease through spring term, where we find a rather low relationship between information and communication skills course grades. Females, although showing some decrease in relationship term by term, do not present as marked a decrease as males.

The meaning to be derived from these correlation coefficients is unclear. First, one might state that the initially high correlation between C.Q.T. Information and communication skills grades reflects differences in students' scholastic background and preparation for college work. As the students continue through college, these original differences tend to be equalized and the student who was initially well prepared for college work has less of an advantage over the student who was less well prepared. Moreover, recognizing that the social norms of the male high school tend to be somewhat different from the generally prescribed norms for the female high school student, it is not particularly surprising to find that males tend to appear to "change" more in information or knowledge than females. This "change" would then be reflected in a lowered correlation as the initial measure of information (Fall, 1958) no longer accurately reflects students' subsequent information status (Winter and Spring, 1959).

In Natural Science, we find an interesting contrast in relationships. While reading ability and the verbal and total C.Q.T. scores were the best predictors of grades in communication skills, we find that the Information and Numerical scales of the C.Q.T. are somewhat better in grade prediction in natural science. In fact, for the third term of natural science, we find that either the numerical or information scale provide equally as good or better predictions of grades than the total C.Q.T. score of which they constitute a part. Of especial interest is the fact that verbal C.Q.T. scores correlate essentially zero with instructor grades for the third term of the course.

Several questions arise when the relationships are closely examined. For example, why doe the C.Q.T. Information score drop so sharply in predicative ability in second and third term communication skills, and in natural science remain fairly high and constant from term to term?

No definite answer is available. There are several possibilities which might be suggested, no one of which provides a completely satisfactory answer by itself. One possibility revolves around the fact that the subject matter content of the Communication Skills course is somewhat less broad and varied than is the content base of Natural Science. For example, the first term subject matter of Natural Science consists mainly of reproduction and cell theory, the second term of geological processes, and physics and chemistry dominate the third term of the course as content base. While many of the broad objectives of the course continue from term to term, this change in content base gives students with a broad subject-matter of "information" background a consistent advantage. Thus, while a student may"refresh" his information background in cell theory and reproduction, this "information" may not contribute excessively toward the other two terms of the course.

One possible answer, then, to the question of differences in the pattern of correlations between C.Q.T. informational score and grades in the two courses is that while information, or subject matter from one term of Communication Skills serves as a basis for the following term's communication skills subject matter, in the Natural Science course, subject matter tends to have less content continuity. The "information" learned in the first time of Communication Skills may change a student's "true" standing on the C.Q.T. information factors which are predicting the second and third term in the course. In Natural Science, however, it may be that the C.Q.T. information factors which predict course grades are different from term to term and not as much influenced by the previous term's work. These suggestions are, however, highly speculative and there is little or no evidence available to support such generalizations.

Other possibilities might relate to the fact that more students accelerate in the second and third terms of Communication Skills than in the second and third terms of Natural Science. Thus, the range of ability might be reduced and this reduced range reflected in a sharp drop in the correlation coefficients for the latter two terms. At any rate, additional investigation will need to be done before these and other findings can be clearly explained or interpreted.

In regard to the zero correlation between verbal ability and natural science instructor grades during the third term, one must again make reference to the nature of the natural science course content. It would seem apparent that there is some relationship between verbal ability and the learning of biological and geological concepts. There is, however, no apparent relationship between verbal ability and the ability to learn physics and chemistry concepts. These findings agree with those of Dr. Juola of Michigan State University who found that verbal ability was not highly related to success in various freshman and sophomore sections of chemistry and mathematics.

One additional observation is worth mention. We have observed in the previous data, a discrepancy between the relationship of the various cognitive variables under consideration and instructor and examination grades. Generally speaking, the cognitive variables are more highly correlated with examination grades than with instructor grades (10 to 20 points higher).

An examination of the relationship between natural science course grades and

C.Q.T. scores will indicate that this trend does not appear in this instance. It may be that this represents a more "objective" instructor grading system, or may also indicate that informational and numerical abilities are of such great importance in receiving a good instructor grade that some lack of "objectivity" in the assignment of grades still produces a high correlation with these abilities.

HYPOTHESIS V: CHANGE IN INVENTORY OF BELIEFS, CRITICAL THINKING, AND DIFFERENTIAL VALUES INVENTORY SCORES AFTER ONE YEAR OF COLLEGE.

The hypothesis to be tested suggests that there will be change in stereotypy (IB), critical thinking ability (CT) and traditional values (DV) after one year of college. Indeed it is entirely conceivable changes may be only minimal and not statistically significant. Jacob (36) reported that there is an over-all constancy of student values, the change from freshman to senior year being very slight. Dressel and Mayhew (14) reported that the greatest gains in stereotypy and critical thinking were made in the freshman year. Research conducted in values has demonstrated that some values undergo marked change over a period of time (39), while other values change very little (58).

The subjects used in this phase of the study were freshmen who entered Michigan State University in the fall term, 1958 and who were still enrolled as of May 11, 1959. Of the original 2,746 students who were tested in the fall, 1958, 303 withdrew some time during the year. Of the 2,443 students who were still enrolled at the time of the post-testing session, usable test papers were received from 2,219 students (91 per cent of the eligible population). The analysis of change data is based on the data of these 2,219 subjects.

Reference to Table 50 reveals[1] that on both the pre- and post-test, males have a higher mean Critical Thinking ability and traditional value score while females have a higher mean Inventory of Beliefs score. In addition, the males have a slightly higher variancy in traditional scores and Inventory of Beliefs. The differences in mean scores between the sexes on both pre- and post-tests are significant beyond the .05 level of confidence. In other words, males are more stereotypic, are more traditionally-oriented in values, and have higher mean critical thinking scores.

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[1] Tables 50 and 51 are included in the text.

TABLE 50

MEANS AND STANDARD DEVIATION ON INVENTORY OF BELIEFS TEST OF CRITICAL THINKING AND DIFFERENTIAL VALUES INVENTORY (TRADITIONAL SCORE) PRE- AND POST-TEST

	MALES				FEMALES			
	Pre-Test		Post-Test		Pre-Test		Post-Test	
Test	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
I B	63.33	13.90	65.75	14.72	65.10	12.93	68.22	14.44
C T	32.04	6.88	36.62	6.62	31.88	6.99	36.12	6.92
D V	34.71	6.94	32.84	7.53	33.53	6.91	31.68	7.11

Both males and females changed significantly[2] in their degree of stereotypy, their critical thinking ability, and their tradtional values during their freshman year at college. The change was in the direction of less stereotypy, improved critical thinking ability, and a decrease in importance attached to traditional values.

One of the problems associated with analyzing test-retest results is that of a negative correlation between initial test score and amount of change or gain. A variety of explanations may be advanced to account for this phenomenon, some of these being (1) the effect of regression, (2) ceiling effect, (3) motivation, and (4) instructional effect. The data presented in Table 51 demonstrates that one or more of the above factors are operating. For females, the correlations between gain and initial score range from -.24 to -.39; for the males the range is from -.28 to -.38. In all instances, the correlations are significantly different from zero. One hypothesis which may be advanced to account, in part at least, for resultant changes, is that of immersion in campus activities. In the area of attitudes, values, and critical thinking ability, we might expect that student mores, college life, instructors, and courses would play some part in student behavior. We will now consider some of these experiential factors in relation to initial test score and change score.

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[2] $p < .05$

General Immersion. As used in this study, the term general immersion pertains to the extent or degree to which a student was involved in campus activities. The activities may be of a social nature or they may be academic in nature; the activities may be structured, that is, established in the sense of clubs or interest groups or they may be unstructured such as "bull-sessions," dates, and so forth. Regardless of the type of activity, a questionnaire was constructed in which 32 items were keyed General Immersion. On the basis of previous research, one might hypothesize that students who are stereotypic in their beliefs are less likely to be involved in campus activities in contrast to the more "flexible" student. The correlations between initial IB score and general immersion score, although positive for both males and females (.05 and .04 respectively) is not statistically significant. Going one step further, one might expect that involvement in campus activities might condition changes in stereotypic behavior. This however, is not so for females as evidenced by the correlation between change in IB and general immersion score (r .04). There is however, a slight, but significant relationship between change in IB and general immersion score for males (r .07). Although these and some of the other inter-correlations are statistically significant, for all practical purposes, they are so small as to be considered negligible. In other words, one cannot relate the changes in IB, critical thinking, or DVI traditional scores to general immersion scores.

Other experiential factors. Some other factors considered in studying change were experiences that were classified as social structured, social unstructured, academic, and personal interaction. In some cases, the relationship between amount of change and degree of involvement in a particular type of activity was statistically significant. Once again, however, the correlations were so small that although of statistical significance, they are of practical unimportance.

TABLE 51

Intercorrelations for Initial Scores, Change Scores, and

Experience Inventory Scores

1.	Initial I.B.		49	-04	-24	-01	00	04	-04	-02	03	13	02
2.	Initial C.T.	30		00	01	-35	-02	06	-04	08	00	05	02
3.	Initial DVI	04	03		02	-03	-39	-02	-06	-19	17	16	-09
4.	Change I.B.	-28	04	-06		20	03	04	-02	01	07	06	01
5.	Change C.T.	-07	-38	-02	13		21	-01	02	-08	01	01	-03
6.	Change DVI	-07	-02	-36	06	16		-03	-02	-04	03	-02	-03
7.	General Immersion	05	01	-02	07	-06	-05		68	34	18	41	75
8.	Social Structured	-07	-05	-09	00	-03	-02	71		03	-01	16	56
9.	Social Unstructured	-04	-02	-16	01	-02	-10	26	01		-23	-20	47
10.	Communication of Knowledge	08	05	09	06	04	06	24	03	-22		06	-08
11.	Communication of Affect	15	03	15	06	-04	-04	44	20	-18	12		40
12.	Personal Interaction	-01	-01	-07	04	-07	-06	77	61	45	-03	40	

Note -- Decimals preceding all entries have been omitted.
Females above the diagonal, males below the diagonal. For N=1124(males) or N=1095(females) a correlation of .06 is significant at the .05 level.

It is readily seen that many problems lie unresolved as of this initial analysis. It would appear that the factor of general academic aptitude as measured by the total score of the CQT is of little practical importance in interpreting change. Although some of the relationship between such things as (1) initial status on personality traits measured and change and (2) initial status on personality traits measured and degree of involvement in certain types of experience are small but statistically significant, the findings raise a host of further questions:

1. To what extent is change in attitudes and in values related to degree of involvement in various types of experiences? Do students change in their attitudes of stereotypy and traditional values because of certain experiences? Do students engage in certain types of experiences because of their personality makeup and would they change regardless of their experiential background?
2. What kind of students engage in what kind of experience?
3. Do those students who change in stereotypy, critical thinking, and traditional values do so because of the experience or is it primarily the effect of regression?
4. Are the changes largely the result of social adaptation to college mores or are changes associated with critical thinking?
5. Inasmuch as the relationship between critical thinking and stereotypy is significantly greater for females than males (.49 and .30 respectively) are changes in one the result of the other?
6. Is there a pattern of experiences that might distinguish the "changers" from the "non-changers"?
7. Are changes in traditional values more related to changes in critical thinking than they are to changes in stereotypy?

Summary

A variety of explanations were advanced to try and account for some of the changes.

In addition, numerous questions were raised for further study.

During their freshman year of college, both males and females changed significantly in degree of stereotypy, critical thinking ability, and traditional values. The change was in the direction of less stereotypy, higher critical thinking scores, and less regard for the values of puritan morality, meaning or work and responsibility, and emphasis on the future.

CHAPTER IV

SUMMARY AND CONCLUSIONS

Statement of the Problem

The purpose of this study was to learn whether there is a significant difference in critical thinking ability, attitudes of stereotypy and dogmatism, and traditional values (a) among socio-cultural and curricular groups, and (b) between students who withdraw from college before completing their freshman year and those who complete the freshman year. We were also interested in studying the interrelationship among the measures used; especially the relationship between academic performance (as measured by grades received on common final examinations in Communication Skills and Natural Science as well as grade-point average) and stereotypy, dogmatism, critical thinking ability, traditional values and academic aptitude as measured by tests purporting to measure these traits. In addition we were desirous of studying the changes and relations among the changes in critical thinking, stereotypy, and traditional values after one year of college. The next three years of the study will be devoted primarily to the study of changes and of the factors related to these changes.

Design of the Study

During Orientation Week in the fall term, 1959, a battery of tests[1] was administered to 2,973 freshmen entering Michigan State University. The only restriction imposed in the selection of the population was that the student be attending college for the first time. Students transferring from another college or university were not included.

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[1] The general battery consisted of the following instruments: ACE Inventory of Beliefs, Form I; ACE Test of Critical Thinking, Form G; Rokeach's Dogmatism Scale; Prince's Differential Values Inventory; MSU Reading Test (revised form) College Qualification Test; and a Biographical Data Sheet especially constructed for this study.
Random samples of approximately 450 students were also tested with Wesley's Rigidity

Usable and complete test data were obtained for 2,746 students (1436 males and 1310 females) in the pre-test session and 2219 students(1124 males and 1095 females) in the post-test session.[2]

To study the interrelationship among the various test measures and the interelationship between measures used and academic performance, Pearson product-moment correlations were computed.

Differences between (a) enrollees and withdrawals, (b) socio-cultural-educational groups, and (c) pre- and post-test results were tested for significance by the analysis of variance technique. Whenever necessary, analysis of covariance was employed.

Major Findings.

1. There are significant differences in attitudes, values, and critical thinking ability among Michigan State University students with different socio-cultural backgrounds, and among Michigan State Univeristy students majoring in different curricula.[3]

(a) Males are significantly more stereotypic and dogmatic than females. Whereas males tend to regard more highly the values of sociability, conformity, relativistic moral attitudes, and an emphasis upon the present, females regard more highly the meaning or work and responsibility, puritan morality, and an emphasis on the future. While females are better readers, males possess more general academic aptitude.

(b) Catholic students as a group are more stereotypic and dogmatic than either Protestants or Jews. In addition, Catholic students also have significantly higher traditional value scores. Jewish students, on the other hand, are more emergent in

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Scale; a Religious Concepts Inventory; and the Allport-Vernon-Lindzey Study of Values.

[2] The only instruments readministered were the Test of Critical Thinking, the Inventory of Beliefs, and the Differential Values Inventory. In addition, an Experience Inventory was administered for the first time.

[3] Although arrangements have been made for similar testing at another college, there is, at the moment, no basis for relating the stated findings to other than the Michigan State University freshman student group.

their values. The mean scores of students who attended a parochial high school indicate that they are more stereotypic and dogmatic and have higher traditional values than students who attended a public or private high school.

(c) Males have a significantly higher mean score on the theoretical, political, and economic scales of the Study of Values test. Females on the other hand, score significantly higher in the aesthetic, social, and religious areas.

(d) Presbyterian males and females are less stereotypic than other Protestant groups while Baptist males and females are more stereotypic, are more dogmatic and have the highest mean traditional value score.

(e) As a group, females majoring in non-technical curricula such as the social sciences, humanities, and communication arts, are less stereotypic and less dogmatic than those females in the vocationally-oriented curricula (home economics and medical technology). On the other hand, females in medical technology have the highest mean traditional values score while those in business and public service have the lowest mean traditional value score. While male freshmen in Veterinary Medicine also have the highest mean traditional value score, those male students who have not chosen a major have the lowest mean traditional value score. The analysis of mean Inventory of Beliefs scores indicate that males in physical education and agriculture are most stereotypic, while males in the physical and biological sciences are, as a group, least stereotypic in their beliefs.

(f) There is no significant difference in attitudes and values between those students whose parents are native-born and those whose parents are foreign-born.

(g) The group of students whose parents have only attended or completed high school are more stereotypic and have higher mean tradtional value scores than those students whose parents attended or completed college.

(h) Males and females with farm backgrounds have higher mean traditional value scores than those students who came from a predominantly urban center. The latter group have the highest emergent value scores.

(i) Whereas the most stereotypic group of males come from a farm, their female counterparts come from a city with a population of 25,000 - 100,000. Somewhat the same pattern holds for dogmatism, in that the females who come from a city with over 100,000 population are the most dogmatic group, while the most dogmatic males lived a major portion of their lives on a farm.

(j) Students who come from homes where the father is in the "laborer-class" and the parents have only a grade or high school education are more stereotypic and have higher mean traditional value scores than those students who come from homes where the parents attended college and the father is an executive or professional man.

It is readily evident that there are significant differences in critical thinking ability, attitudes of stereotypy and dogmatism, and traditional values among the various socio-cultural groups. These findings, as well as those of other studies, support the thesis that although there is a common value structure present, there are variations among and within socio-cultural groups.

Comparisons made between the freshman student population at Michigan State University with respect to certain socio-cultural factors indicate that student characteristics are changing -- in part, because the proportions from the various social classes are changing. Attitudes and values differ among the middle, high, and low social classes. Attitudes and values have their roots in the home, and since there are significant differences in degree of stereotypy, dogmatism, and traditional values among religious groups, rural and urban groups, and socio-economic (as measured by father's occupation) groups, to mention a few, we must recognize that all students will not react in a similar way to common experiences. Nonetheless, only as changes are related to individual experiences will we be able to learn much about the effect of the total educational environment upon student attitudes, values and critical thinking ability.

That there are significant differences in attitudes between males and females and among students choosing to major in technical-oriented and liberal arts curricula is readily evident from this and other studies. The meaning of this for higher education is uncertain. The differences may be relevant to success in these various fields or they may be incidental and transient. The extent and nature of changes of attitudes and values in relation to persistence in, or change of major field needs study. The implications for curriculum planning also require consideration.

The students enrolled in technical programs appear to be more stereotypic, and to have less regard for the traditional values (puritan morality, the meaning of work and responsibility, and emphasis on the future) than the student body in a liberal-arts college. Should the course content for engineers be altered so that the major emphasis will be upon developing a system of "more acceptable" values? Is the existing set desirable? Is the whole matter to be regarded as irrelevant to the curriculum and instruction? In any case, college instructors must be cognizant that the attitudes and values of engineers may be markedly different from those of social science majors. Stereotypy should not be interpreted as indifference; a relativistic moral attitude should not be considered as disrespect for feelings of guilt and honesty; and a rather fatalistic outlook should not be confused with a drastic disregard for the future. Differences in attitudes and values between students and teachers hold the possibility of change. Coincidence in attitudes of students and teachers augurs reinforcement. Some insight into what these attitudes and values are should precede either.

2. The study of the interrelationship among attitude, value, and cognitive tests revealed that:

(a) For the total group, the relationship between the Inventory of Beliefs, Rokeach's Dogmatism Scale, and Wesley's Rigidity Scale is positive and statistically significant.[1] Although this is also true for the males, it is seen that for the females, the relationship between stereotypy and rigidity (although positive) is not significant.

(b) For both males and females, the relationship between the religious scale (of the Study of Values) and the four traditional value subscales of the Differential Values Inventory is positive and significant, while the correlation between the religious scale and the emergent subscales is negative and significant. There is a positive and significant relationship between the social value and sociability scores.

(c) For the males, there is a significant negative correlation between the traditional score of the DVI and the Economics and Political value scores.

(d) For the females, there is a significant negative correlation between the traditional score and the Aesthetic and Political values score.

(e) There is a significant relationship between dogmatism and traditional values for both males and females.

(f) There is a moderately high relationship among the Reading, CQT, and Critical Thinking Tests.

(g) For both the males and females, there is no significant relationship between the traditional score of the DVI and either the attitude or cognitive tests.

(h) There is a significant relationship between the attitude tests and the cognitive measures.

One of the most significant findings to emanate from this phase of the study is that relating to the interrelationships among cognitive and affective measures. The findings of this study support the thesis that test labels of attitudes and values may be misleading in that they measure different traits (15, 22, 45). Although we found a substantial relationship between stereotypy and dogmatism, some traits involved in one seem not to be involved in the other. On the other hand neither stereotypy nor dogmatism are related to personality rigidity. Similar findings were evident when comparisons were made between the value tests used. Attitudes of stereotypy, dogmatism, and rigidity must be considered as separate entities and not grouped together under the term "rigidity" else this term becomes so broad as to become meaningless.

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[1] See footnote 2, p.37.

3. The study of Michigan State University students who withdrew before completing their freshman year revealed that a larger percentage of men than women (58 vs. 42 per cent) withdrew. It is also evident that these students are significantly different from those who remained in college in that withdrawals (a) display less critical thinking ability, (b) are not as proficient in the reading and general academic aptitude areas, (c) are more stereotypic, and (d) come from a lower parental socio-economic-educational level. Although the withdrawal group was more dogmatic and had less traditional values, the differences were not significant.

Before practical application of these findings is possible, however, more research needs to be done. If at least some withdrawals from college involve some conflict of educational experience with the attitudes, values, and abilities of students, what kinds of educational experiences are more appropriate? Do different curricula in the university affectively attract students of different attitude, value, and ability patterns? To what extent is the attitude, value, and ability pattern of students who withdraw from college or change majors atypical of the curriculum from which they withdrew or changed? Would a change in the direction of a curriculum with an attitude, value, and ability pattern more in line with the characteristics of the student modify the tendency toward withdrawal? These are questions which cannot be directly answered but upon which some light may be thrown by the extension of the study through the next three years.

4. The study of the relationship of selected cognitive and affective variables to student performance in Natural Science and Communication Skills revealed that:

(a) There is a small (.10 to .33) positive, and significant relationship between stereotypy (IB) and instructor, exam, and total grade in natural science and communication skills for both males and females in the fall and winter terms. This trend is also present for the males in the spring term. For the females, however, the relationship between stereotypy and grades in Communication Skills (spring term) is not significant.

(b) For males, the relationship between examination grades (in Communication Skills and Natural Science) and dogmatism is significant in all three terms. The relationship between grade-point-average (in each term) and dogmatism is also significant. While the relationship between Natural Science instructor grade and dogmatism is significant in all three terms, the relationship between Communication Skills instructor grade and dogmatism is not significant.

(c) Unlike the males, the only significant relationships for the females are between dogmatism and (1) fall and winter Communication Skills examination grade, (2) fall and winter GPA, (3) fall and spring term exam grades in Natural Science, (4) spring term exam and final grade in Natural Science, and (5) fall term GPA.

(d) The only significant relationships between traditional scores and academic performance were for males in winter term communication skills final grade and for fall term females in natural science.

(e) For both males and females, there is a significant relationship between critical thinking ability and grades received in natural science, communication skills, and total GPA. A somewhat similar pattern (with a few exceptions) is evident for the relationship between grades and either reading ability or general academic aptitude (CQT).

The analysis of the relationship between grades during the freshman year in college and attitudes, values, and abilities yields some implications for educational practice. Although the highest correlation coefficients were between various measures of ability, aptitude and grades, the relationship between these factors and academic performance does not exclude the influence of additional factors beyond ability and aptitude. In fact, the ability factors could be said to account for only one quarter of the total variation in grades. Moreover, the predictive ability of these measures tends to decrease over the freshman year. That is, as the time interval between the measurement of the ability or aptitude and the prediction of grades increases, the magnitude of the relationship is likely to decrease. Thus, for males one could say that academic aptitude as measured in the fall of the year accounted for approximately 35 per cent of the variation in grades, while in the spring the initial fall measure accounted for a little more than 10 per cent of the variation in grades.

The relationships which we have found between attitudes and values and college grades indicate that these factors are operative only to a limited extent in determining grades. The less stereotypic, less dogmatic, more traditionally value-oriented student is somewhat more likely to receive better grades than his opposite in attitude-value pattern structure.

The relationship between attitudes and values and grades is small compared to the relationship of academic aptitude, critical thinking ability, and reading ability to grades, but it is possible that relationships between attitudes, values, and grades may vary from course to course and from instructor to instructor.

If attitudes and values contributing to success in one course or with one instructor, have little influence in another course, and have a negative influence in a third course, group results may become meaningless or at least uninterpretable.

5. The analysis of pre- and post-tests results for the 2,219 students still enrolled at Michigan State University (in the spring term) revealed that for both males and females there is a significant change in degree of stereotypy, in values, and in critical thinking ability over the period of 8 months. The changes were in the directions of less stereotypy, more emergent values, and a higher critical thinking score.

Some of the correlations between degree of change and types of experience, although small, are significant.

It appears that attitudes and values are modified in different degrees and by different types of experiences. However, the relation is complex in that our data suggest that a type of experience tending to modify stereotypy might not modify rigidity. It is quite probable that the experience inventory used is not adequate to the study of these complex interrelationships.

Conclusions

The initial phase of a four-year study of "Critical Thinking, Attitudes, a nd Values" in Higher Education has shown that:

1. There are significant socio-cultural differences in selected cognitive and affective variables.
2. There are significant differences in stereotypy, critical thinking ability, general academic aptitude, and socio-economic-educational index between students who complete their freshman year and those who withdraw from college during their first year.
3. The relationship between grades (and over-all academic performance as measured by the grade-point-average) and the affective variables varies for different courses and terms. The relationship is generally lower than that between grades and the cognitive measures.
4. Over a period of time, students become less stereotypic, better critical thinkers, and more emergent in their values.

A host of questions have been raised throughout the report which deserve further study. In the next three years, the researchers will attempt to answer some of these questions. Without elaborating in detail as to the specific design which will be employed, it is felt that a brief description should be made.

A random sample of students who have either changed markedly or did not change in degree of stereotypy, values, and critical thinking ability will be identified and studied more intensively. By means of questionnaires, rating scales, and interviews, an attempt will be made to learn why some people undergo marked change while others change very little. For example, we would like to know whether a common pattern of experiences operates to the same extent on a stereotypic student as they do on a non-stereotypic student. We hope to learn whether certain types of experiences result in more pronounced change than other experiences. Preceding this, however, is a more intensive study of individual performances on the pre- and post-test data.

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APPENDIX A

The Derivation of the Socio-Economic-Educational Index Score

SOCIO-ECONOMIC-EDUCATIONAL INDEX SCORE

Data were available on the occupation of the father and the educational level of the father and the mother. Using the occupational rating scale developed by Paul Hatt and C.C. North (3), each of fathers' occupations was given a point value representing a particular position in the prestige continuum. The educational levels of the father and mother were given point values according to the following scheme:

Points	Category
1	If attended grade school (grades 1 to 8) but did not finish
2	If completed grade school through grade 8
3	If attended high school (grades 9-12) but did not finish
4	If graduated from high school
5	If attended college but did not graduate
6	If graduate from college
7	If attended graduate school or professional school but did not attain a graduate or professional degree
8	If graduate from graduate or professional school

These three variables (occupational prestige rating of father, and educational level of father and mother) were then combined into a single socio-economic-educational index score through the use of factor analysis. Weights were obtained for the first factor loadings (26).

The correlation coefficients of each of the three variables with the first factor were as follows:

Educational level of the father.	.785
Education level of the mother	.584
Occupational prestige rating of father	.731

If one wishes to use these items to form an index of the first factor, it is necessary to transform the raw scores into standard scores and multiply each standard score by the correlation coefficient of the respective item with the first factor. The following formula was used:

$$I = .786 \frac{(X_1 - \bar{X}_1)}{s_1} + .584 \frac{(X_2 - \bar{X}_2)}{s_2} + .731 \frac{(X_3 - \bar{X}_3)}{s_3}$$

where I = the index score of socio-economic-educational level.

X_1, X_2, X_3 = the raw scores of the three variables.

$\bar{X}_1 , \bar{X}_2 , \bar{X}_3$ = the mean scores of each variable.

s_1 , s_2 , s_3 = the standard deviation of each variable.

APPENDIX B

Biographical and Other Characteristics of the 1958 M.S.U. Freshman Class

TABLE 2

Biographical and Other Characteristics of the Population Studied

Variable	Males N	Males %	Females N	Females %
Age				
Under 18	346	24	419	32
18	865	60	844	64
19	95	7	31	2
20 or over	129	9	16	1
No Response	1	0	0	0
Marital Status				
Single	1383	96	1295	99
Married	46	3	10	1
Divorced	2	0	3	0
Widowed	3	0	0	0
No Response	2	0	2	0
Nativity of Parents				
Mother native-born, father foreign-born	86	6	89	7
Father native-born, mother foreign-born	43	3	42	3
Both foreign-born	64	4	56	4
Both native-born	1239	86	1111	85
No Response	4	0	12	1

Table 2, contd.

	Males		Females	
	N	%	N	%
Father's Education				
Some grammar school	92	6	31	2
Completed grammar school	203	14	122	9
Some high school	171	12	156	12
Completed high school	429	30	306	23
Some college	186	13	224	17
Completed college	213	15	245	19
Some Prof. or Grad. school	27	2	39	3
Completed Prof. or Grad. school	106	7	180	14
No Response	9	1	7	1
Mother's Education				
Some grammar school	43	3	22	2
Completed grammar school	120	8	88	7
Some high school	169	12	143	11
Completed high school	625	44	490	37
Some college	152	11	201	15
Completed college	242	17	225	17
Some Prof. or Grad. school	22	2	39	3
Completed Prof. or Grad. school	57	4	96	7
No Response	6	0	6	0
Type of secondary school attended				
Public	1296	90	1194	91
Private	46	3	38	3
Parochial	94	7	78	6

Table 2, contd.

	Males		Females	
	N	%	N	%
Size of high school graduating class				
Under 25	39	3	33	3
25 - 99	433	30	305	23
100 - 199	389	27	350	27
200 - 399	303	21	338	26
400 - 999	237	17	267	20
1,000 and over	31	2	15	1
No Response	4	0	2	0
Rank in high school graduating class				
Lower third	77	5	28	2
Middle third	528	37	296	23
Upper third	822	57	979	75
No Response	9	1	7	1
Amount of Education Disired				
1 year of college	5	0	9	1
2 years	7	0	67	5
3 years	2	0	8	1
4 years	839	58	997	76
Graduate or Professional school	571	40	227	17
No Response	14	1	2	0

Table 2, contd.

	Males		Females	
	N	%	N	%
Size of home community	224	16	114	9
Village (250-2,500)	179	12	138	10
Town (2,500-25,000)	383	27	364	28
City (25,000-100,000)	284	20	340	26
City over 100,000	365	25	349	27
No Response	1	0	5	0
Religious Preference				
Catholic	262	18	232	18
Jewish	65	5	100	8
Protestant	1006	70	936	71
None	54	4	18	1
Other	19	1	14	1
No Response	30	2	10	1
Father's Occupation				
Business Owner	202	14	211	16
Professional	148	10	216	16
White Collar	216	15	209	15
Farm Owner	124	9	75	6
Teacher	46	3	45	3
Skilled Labor	291	20	193	15
Semi-Skilled	98	7	61	5
Low or unskilled	18	1	6	0
Public Service	30	2	18	1
Executive or managerial	144	10	183	14
Deceased or retired	88	6	78	6
No Response	31	2	15	1

Table 2, contd.

	Males		Females	
	N	%	N	%
Mother's Major Occupation				
Business Owner	10	1	19	1
Professional	31	2	33	3
White Collar	152	11	161	12
Farm Owner	1	0	--	--
Teacher	84	6	99	8
Skilled Labor	17	1	8	1
Semi-Skilled	39	3	25	2
Low or unskilled	1	0	1	0
Public Service	19	1	14	1
Housewife	972	68	908	69
No Response	86	6	31	2
Mother's Secondary Occupation (part-time)				
Business Owner	4	0	7	1
Professional	9	1	14	1
White Collar	53	4	38	3
Farm Owner	1	0	1	0
Teacher	13	1	28	2
Skilled Labor	4	0	4	0
Semi-Skilled	11	1	6	0
Low or unskilled	12	1	7	1
Executive	1	0	1	0
Housewife	1328	92	1204	92

Table 2, contd.

	Males		Females	
	N	%	N	%
Father's Secondary Occupation				
Business Owner	10	1	14	1
Professional	4	0	7	1
White Collar	23	2	25	2
Farm Owner	45	3	17	1
Teacher	2	0	7	1
Skilled Labor	22	2	12	1
Semi-Skilled Labor	22	2	7	1
Unskilled	11	1	4	0
Public Service	--	0	4	0
Executive	1	0	--	--
None	1296	90	1215	93
Curricular Major				
Agriculture	177	12	3	0
Business and Public Service	315	22	184	14
Engineering	419	29	8	1
Home Economics	2	0	174	13
Science and Arts	212	15	317	24
Veterinary Medicine	55	4	50	4
Education	27	2	272	21
Communication Arts	43	3	102	8
No Preferance (None Chosen)	186	13	200	15

Table 2, contd.

	Males N	Males %	Females N	Females %
Parental Relationships				
Excellent	706	49	713	54
Good	537	37	445	34
Average	143	10	102	8
Fair	41	3	40	3
Poor	4	0	9	1
No Response	5	0	1	0
Living Accomodations at MSU				
Dormitory	1121	78	1138	87
Apartment	53	4	11	1
Rooming House	28	2	6	0
Fraternity/Sorority House	4	0	--	--
At home with family	212	15	149	11
No Response	19	1	6	0
Source of financial support				
Parents	906	63	1119	85
Job	274	19	67	5
Athletic Scholarship	41	3	--	--
Loans	15	1	8	1
G. I. Bill	68	5	7	1
Academic Scholarship	114	8	106	8
No Response	18	1	3	0

Table 2, contd.

	Males		Females	
	N	%	N	%
Denomination of Protestantism				
Dutch Reform	142	14	161	17
Episcopal and Anglican	55	5	94	10
Quaker, Mennonite	5	0	3	0
Lutheran	126	13	100	11
Congregational	87	9	116	12
Christian Scientist	18	2	19	2
Baptist	86	9	66	7
Naz., Ch. of God, Pent.	4	0	2	0
Methodist	271	27	272	29
Other	80	8	71	8
No Response	132	13	32	3
Amount of college education expected				
1 year	15	1	25	2
2 years	32	2	149	11
3 years	8	1	19	1
4 years	1013	70	1016	78
Graduate or Prof. school	359	25	99	8
No Response	9	1	2	0
Degree of Participation in High School Activities				
Very Active	570	40	706	54
Moderately Active	771	54	572	44
Not Active	87	6	32	2
No Response	8	1	--	--

APPENDIX C

Means and Standard Deviations on Selected Cognitive and Affective Variables

TABLE 3

Means and Standard Deviations For Males and Females on Selected Cognitive-Affective Variables

Test Variable	Males (n = 1436)		Females (n = 1310)		
	$\overline{X}$	S.D.	$\overline{X}$	S.D.	t
Inventory of Beliefs (IB)	62.86	14.09	64.77	12.85	3.72*
Test of Critical Thinking (CT)	31.51	7.17	31.29	7.15	.80
DV-Traditional Score (DVI)	34.67	6.92	33.59	6.97	4.06*
Dogmatism Scale (D-1)	168.19	25.35	163.56	25.48	4.77*
MSU Reading Test (Rdg.)	27.04	6.41	28.14	6.38	4.51*
CQT-Total Score (CQT)	126.46	26.26	116.47	24.65	10.27*

* Significant beyond the .05 level.

TABLE 4

Means and Standard Deviations for the Study of Values and Rigidity Measures

		Males		Females	
		Mean	S.D.	Mean	S.D.
Wesley's Rigidity Scale*		25.93	5.38	26.00	5.88
AVL+ - (Allport-Vernon-Lindzey)	Theoretical	44.81	6.57	39.03	6.86
	Economic	43.68	6.39	38.28	6.56
	Aesthetic	31.82	7.25	38.26	7.07
	Social	34.99	6.23	39.25	6.69
	Political	42.82	5.99	39.34	6.27
	Religious	41.88	8.31	45.81	7.70

* $N_{males} = 260$

$N_{females} = 224$

+ $N_{males} = 256$

$N_{females} = 197$

APPENDIX D

Means on Selected Cognitive and Affective Variables For Some Sub-Groups of the 1958 M.S.U. Freshman Population

TABLE 5

Means of Certain Cognitive and Non-Cognitive Test Scores Among Females Having Different Majors

Major or Curriculum	n	Test Score Mean IB	CT	DVI	D-1	Rdg.	CQT
Business and Public Service	184	63.80	30.57	33.22	162.65	27.18	1107.81
Home Economics	174	62.21	30.74	34.62	166.04	27.44	115.54
Science and Arts	317	67.40	32.64	34.31	160.95	29.56	124.42
Veterinary Medicine[*]	50	61.48	33.04	36.18	171.02	30.26	129.30
Education[+]	272	63.51	29.55	32.85	166.27	26.50	108.61
Communication Arts	102	67.33	32.65	32.24	160.20	29.82	119.74
No major chosen	200	64.76	31.32	32.88	162.58	28.06	116.93

[*] The majority of women are preparing to be Medical Technologists

[+] These are Elementary Education majors

TABLE 6

Means of Certain Cognitive and Non-Cognitive Test Scores Among Males Having Different Majors

Major or Curriculum	n	Test Score Means IB	CT	DVI	D-1	Rdg.	CQT
Agriculture	177	60.10	29.06	35.59	169.53	24.85	114.71
Business and Public Service	315	61.20	30.43	33.96	169.25	25.70	118.27
Engineering	419	62.23	33.40	35.00	168.22	28.12	135.28
Science and Arts	212	68.52	33.64	35.27	165.10	29.37	137.44
Veterinary Medicine	55	62.42	30.38	36.02	171.47	27.76	123.82
Education	27	55.74	26.67	33.63	175.33	23.18	99.78
Communication Arts	43	67.35	29.65	33.67	163.53	28.05	122.63
No Major Chosen	186	63.43	30.55	33.66	167.67	26.54	124.95

TABLE 7

Means of Some Cognitive and Non-Cognitive Measures For Females With Different Religious Preferences

		Test Score Means					
Religious Preference	n	IB	CT	DVI	D-1	Rdg.	CQT
Catholic	232	60.30	30.59	35.31	169.95	27.18	112.56
Jewish	100	67.11	29.63	30.21	158.77	27.12	112.67
Protestant	936	65.34	31.60	33.59	162.26	28.46	117.82
None	18	74.94	33.44	31.61	149.50	30.44	118.61
Other	14	70.21	33.57	32.64	170.07	28.86	123.78

TABLE 8

Means of Some Cognitive and Non-Cognitive Measures For Males With Different Religious Preferences

		Test Score Means					
Religious Preference	n	IB	CT	DVI	D-1	Rdg.	CQT
Catholic	262	58.26	30.81	35.83	174.09	26.50	122.37
Jewish	65	65.29	31.06	32.03	164.98	27.28	132.48
Protestant	1006	63.55	31.72	34.64	167.53	27.05	126.68
None	54	70.02	32.98	32.68	155.00	29.74	137.02
Other	19	66.84	32.90	34.58	156.05	29.16	128.26

TABLE 9

Means of Some Cognitive and Non-Cognitive Measures For Females Grouped According to Denomination of Protestantism

Denomination of Protestantism	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
Dutch Reformed	161	66.84	32.17	32.49	159.32	28.84	120.00
Episcopal, Anglican	94	63.81	30.11	30.94	157.08	26.85	111.79
Lutheran	97	66.37	31.75	34.07	162.26	28.29	118.33
Cong., Ch. of Christ	114	65.03	32.28	33.48	162.29	29.78	121.40
Baptist	63	63.08	31.33	36.06	167.51	27.67	111.92
Other	90	66.47	32.50	34.90	162.84	30.18	126.20
Methodist	269	65.57	31.56	33.91	165.26	28.24	117.62
Not Declared	52	62.94	29.56	33.96	165.58	27.44	111.25

TABLE 10

Means of Some Cognitive and Non-Cognitive Measures For Males Grouped According to Denomination of Protestantism

Denomination of Protestantism	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
Dutch Reformed	142	65.52	32.78	32.75	164.20	28.13	131.28
Episcopal, Anglican	53	64.75	32.13	33.17	165.81	27.47	130.96
Lutheran	124	61.05	31.62	36.34	171.21	27.18	129.81
Cong., Ch. of Christ	86	62.88	31.96	34.02	167.42	26.85	126.60
Baptist	84	59.83	32.27	36.56	175.62	27.57	124.40
Other	103	63.82	32.74	36.29	166.06	26.85	128.51
Methodist	266	65.25	32.10	34.62	170.84	27.40	127.42
Not Declared	156	64.34	29.66	34.89	162.12	25.67	119.68

TABLE 11

Means of Some Cognitive and Non-Cognitive Measures For Females Coming from Communities of Differing Size

Size of home Community	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
Farm	114	65.14	32.04	36.23	163.38	27.69	116.74
Village, 250-2,500	138	66.21	31.50	33.16	162.97	27.71	116.16
Town, 2,500-25,000	364	65.30	31.43	34.05	163.21	28.28	118.12
City 25,000-100,000	340	63.97	31.67	32.89	163.69	28.44	116.62
City over 100,000	349	64.36	30.41	32.78	164.13	28.00	114.52

TABLE 12

Means of Some Cognitive and Non-Cognitive Measures For Males Coming from Communities of Differing Sizes

Size of home Community	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
Farm	224	60.47	31.33	37.32	171.15	26.00	121.14
Village 250-2,500	179	64.21	31.52	34.39	165.36	26.50	123.39
Town 2,500-25,000	383	63.20	31.20	34.64	168.72	26.93	128.14
City 25,000-100,000	284	64.46	31.49	34.37	166.33	27.74	126.56
City over 100,000	366	62.07	31.94	33.43	168.66	27.51	129.36

TABLE 13

Means of Some Cognitive and Non-Cognitive Measures For Females Attending Different Types of High Schools

Type of High School Attended	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
Public	1188	65.18	31.51	33.51	162.56	28.36	117.06
Parachial	78	59.95	29.59	37.28	174.31	25.42	108.90
Private	38	62.32	28.66	34.50	174.89	27.76	115.95

TABLE 14

Means of Some Cognitive and Non-Cognitive Measures For Males Attending Different Types of High Schools

Type of High School Attended	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
Public	1291	63.52	31.63	34.50	181.05	27.13	127.00
Parochial	94	56.01	30.94	37.32	180.38	26.17	120.47
Private	46	59.00	29.20	33.54	175.17	26.00	123.20

TABLE 15

Means of Some Cognitive and Non-Cognitive Measures For Females Grouped According to Father's Occupation

		Test Score Means					
Father's Occupation	n	IB	CT	DVI	D-1	Rdg.	CQT
Business Owner	211	63.13	30.32	33.58	167.54	27.37	110.00
Professional	216	66.16	31.98	32.39	160.25	29.06	121.68
White Collar	209	65.75	31.52	33.18	161.46	28.31	118.22
Farm Owner	75	63.93	32.48	35.91	164.73	27.96	116.48
Teacher	45	68.47	33.91	33.07	159.64	30.29	123.78
Skilled Labor	193	64.73	30.33	34.61	162.52	27.26	112.84
Semi-Skilled	61	62.90	30.75	35.72	169.02	27.05	114.41
Public Service	18	66.44	31.61	35.28	161.83	27.50	115.06
Executive or managerial	183	63.75	31.15	32.50	163.22	27.83	116.50
Deceased or retired	78	64.13	31.78	33.67	166.18	29.78	120.74

TABLE 16

Means of Some Cognitive and Non-Cognitive Measures For Males Grouped According to Father's Occupation

		Test Score Means					
Father's Occupation	n	IB	CT	DVI	D-1	Rdg.	CQT
Business Owner	202	61.46	30.78	33.50	169.78	26.55	125.42
Professional	148	64.52	31.89	33.68	162.93	28.11	131.39
White Collar	216	63.00	32.41	34.05	168.68	27.09	127.76
Farm Owner	124	59.64	31.49	37.56	178.44	25.74	121.10
Teacher	46	67.20	34.04	34.59	167.54	29.91	139.41
Skilled Labor	291	62.58	30.93	34.81	167.02	27.13	125.71
Semi-Skilled	98	62.02	30.00	35.65	169.17	25.50	115.50
Low or Unskilled	18	62.28	31.39	34.44	172.39	26.67	121.78
Public Service	30	59.47	31.97	35.07	170.30	26.33	125.80
Executive or managerial	144	63.17	31.93	34.62	165.65	27.04	125.42
Deceased or retired	88	65.10	31.93	34.62	165.65	27.04	125.42

TABLE 17

Means of Some Cognitive and Non-Cognitive Measures For Females Grouped According to Father's Education

Level of father's education	n	Test Score Means					
		IB	CT	DV I	D-1	Rdg.	CQT
Some grammar school	31	60.22	29.90	34.26	176.97	25.58	110.39
Completed grammar sch.	122	62.85	31.19	36.17	165.80	28.13	114.44
Some high school	156	63.91	29.97	33.96	165.25	27.24	112.67
Completed high sch.	306	64.52	31.20	34.52	163.91	28.20	116.42
Some college	224	64.30	31.42	32.86	163.76	28.25	115.49
Completed college	245	65.93	31.65	32.64	161.20	28.05	117.14
Some Prof. or Grad. sch.	39	67.97	33.08	32.51	165.59	30.13	124.08
Completed Prof. or Grad. school	180	66.58	31.76	32.20	160.36	29.00	120.91

TABLE 18

Means of Some Cognitive and Non-Cognitive Measures For Males Grouped According to Father's Education

Level of father's education	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
Some grammar school	92	62.55	29.29	36.22	169.75	25.49	119.03
Completed grammar sch.	203	60.83	30.52	35.33	171.24	26.00	120.30
Some high school	171	60.86	31.81	35.40	168.37	27.60	125.60
Completed high sch.	429	62.23	31.50	34.63	168.62	26.49	125.31
Some college	186	64.45	31.40	34.09	168.57	27.13	127.18
Completed college	213	65.04	32.54	33.92	165.82	28.27	132.81
Some Prof. or Grad. sch.	27	62.11	34.96	32.63	168.67	30.11	143.33
Completed Prof. or Grad. school	106	66.25	32.34	33.94	163.20	28.18	132.89

TABLE 19

Means of Some Cognitive and Non-Cognitive Measures For Females Grouped According to Level of Mother's Education

Level of Mother's Education	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
Some grammar school	22	64.82	29.59	34.86	161.86	25.04	105.41
Completed grammar sch.	88	64.25	30.20	35.38	168.91	26.77	111.51
Some high school	143	61.73	31.22	34.26	168.02	27.68	113.16
Completed high school	490	64.66	31.33	33.63	163.89	28.16	116.26
Some college	201	65.80	32.48	32.27	159.40	28.95	120.74
Completed college	225	65.74	31.52	33.49	162.97	28.72	120.12
Some Prof. or Grad. sch.	39	69.15	31.56	34.08	154.08	29.15	115.74
Completed Prof. or Grad. school	96	64.71	29.35	33.31	164.54	27.43	112.17

TABLE 20

Means of Some Cognitive and Non-Cognitive Measures For Males Grouped According to Level of Mother's Education

Level of Mother's Education	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
Some grammar school	43	60.10	30.95	36.23	171.07	25.93	119.28
Completed grammar sch.	120	59.12	29.43	36.71	172.18	25.55	118.15
Some high school	169	62.37	31.39	35.38	165.99	26.61	124.30
Completed high school	625	62.62	31.54	34.44	168.10	26.85	125.87
Some college	152	65.31	32.93	34.10	165.05	28.91	133.56
Completed college	242	63.49	31.60	33.92	169.30	27.53	130.17
Some Prof. or Grad. sch.	22	63.18	31.09	34.36	175.09	27.82	130.09
Completed Prof. or Grad. school	57	66.26	32.37	34.46	168.68	26.84	125.72

TABLE 21

Means of Some Cognitive and Non-Cognitive Measures For Females Grouped According to Nativity of Parents

Parents' Birthplace	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
Mother native-born, father foreign-born	89	66.21	30.61	33.78	158.39	28.44	116.29
Father native-born, mother foreign-born	42	64.38	31.74	34.07	158.36	28.81	116.45
Both foreign-born	56	63.02	30.19	32.75	166.93	27.77	119.80
Both native-born	1116	64.74	31.39	33.58	164.06	28.12	116.29

TABLE 22

Means of Some Cognitive and Non-Cognitive Measures For Males Grouped According to Nativity of Parents

Parent's Birthplace	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
Mother native-born, father foreign-born	86	63.80	31.93	34.76	165.93	27.92	129.51
Father native-born mother foreign-born	43	64.65	31.77	33.56	165.16	26.49	125.07
Both foreign-born	64	66.61	31.42	34.26	168.80	28.89	134.88
Both native-born	1235	62.58	31.48	34.74	169.51	26.90	125.86

TABLE 23*

Means of Some Cognitive and Non-Cognitive Measures For
Females Grouped According to Level of Education Desired

Level of Education Desired	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
1 year of college	9	69.00	31.44	31.00	149.56	27.44	117.22
2 years of college	67	61.82	28.61	31.76	161.84	25.22	100.21
3 years of college	8	55.12	30.00	37.62	174.12	25.38	111.00
4 years of college	997	64.39	30.98	33.20	164.04	27.68	114.44
5 years of college	227	67.43	33.47	35.79	162.16	31.14	130.17
6 years of college	2	68.50	33.50	34.50	163.00	31.50	138.00

* Those desiring less than four years were grouped into a single category for the analysis of the data.

TABLE 24*

Means of Some Cognitive and Non-Cognitive Measures For
Males Grouped According to Level of Education Desired

Level of Education Desired	n	Test Score Means					
		IB	CT	DVI	D-1	Rdg.	CQT
1 year of college	5	57.60	28.40	26.40	174.20	29.40	126.60
2 years of college	7	53.86	21.43	35.14	173.57	20.57	89.57
3 years of college	2	69.50	31.00	36.50	180.50	22.50	99.50
4 years of college	840	61.15	30.48	34.08	169.70	25.74	120.37
5 years of college	570	65.81	33.32	35.77	166.63	29.13	136.30
6 years of college	12	65.08	33.25	35.08	170.08	29.67	144.67

* Since only the four-and five-year groups had a reasonable number of subjects, the differences were analyzed by means of a t-test.

APPENDIX E

Summary of Analysis of Variance F's

TABLE 25

F's for the Various Analyses of Variance for the Female Population

Sources of Variation	Test Variables					
	IB	CT	DVI	D-1	Rdg.	CQT
Level of Education Desired	7.371*	15.999*	14.632*	.630	37.097*	55.020*
Father's Education	4.315*	.043	4.436*	2.225*	2.526*	2.365*
Type of HS attended	6.851*	5.406*	12.301*	11.130*	7.959*	4.034*
Locale	.919	1.948	6.008*	.083	.563	.957
Curriculum	5.271*	4.101*	3.947*	2.454*	9.057*	17.850*
Mother's Education	2.060*	2.219*	2.533*	2.486*	2.561*	4.636*
Father's Occupation	1.563	1.988*	3.376*	1.560	2.149*	3.786*
Religion	16.889*	4.730*	19.398*	10.239*	5.109*	5.560*
Nativity of Parents	.734	.839	.353	2.276	.286	.361

* Significant beyond 5% level

TABLE 26

F's for the Various Analyses of Variance for the Male Population

Sources of Variation	Test Variables					
	IB	CT	DVI	D-1	Rdg.	CQT
Level of Education Desired	6.220*	7.510*	4.590*	2.260*	10.300*	11.800*
Father's Education	11.669*	3.608*	2.243*	1.081	6.308*	7.281*
Type of HS attended	14.535*	2.866	7.936*	14.197*	1.594	3.075*
Locale	3.628*	.545	11.649*	17.779*	3.178*	4.455*
Curriculum	8.562*	16.193*	2.392*	1.254	13.238*	29.277*
Mother's Education	2.917*	2.825*	3.227*	1.377	3.990*	5.535*
Father's Occupation	1.744	2.009*	3.691*	.997	2.857*	4.521*
Religion	16.121*	1.948	6.153*	10.537*	3.897*	6.260*
Nativity of Parents	2.026	.125	.480	1.866	2.642*	2.840*

* Significant beyond 5% level

APPENDIX F

Correlation Matrices

TABLE 27

Intercorrelations of Critical Thinking, Attitudes, Values, and Some Selected Cognitive Variables

1.	Inventory of Beliefs		27	-03	-02	11	-12	-03	08	-10	11	-02	-61	29	26	24	15	28
2.	Critical Thinking	31		00	-02	10	-03	-04	05	-08	03	-01	-18	60	51	48	43	60
3.	DVI - Traditional Score	02	04		76	62	70	73	-67	-68	-70	-74	10	00	01	02	10	01
4.	DVI - Future Time	-02	03	74		28	41	40	-54	-41	-62	-54	06	-05	-03	-04	05	-01
5.	DVI - Individualism	11	11	59	22		32	29	-36	-60	-33	-44	-43	16	22	17	11	21
6.	DVI - Puritan Morality	-04	-05	66	34	24		29	-44	-45	-50	-54	02	-04	-04	-02	06	-01
7.	DVI - Work Success	02	03	72	39	26	25		-51	-49	-49	55	10	-05	-07	-03	07	-02
8.	DVI - Sociability	04	03	-67	-48	-41	-40	-51		30	29	39	-11	01	00	03	-06	01
9.	DVI - Conformity	-15	-10	-67	-41	-58	-41	-46	29		31	39	00	-10	-11	-01	-14	-15
10.	DVI - Relativism	10	-02	-71	-61	-27	-53	-48	25	29		39	-11	05	09	04	-05	04
11.	DVI - Present Time	-06	-01	-74	-55	-40	-50	-56	35	33	39		-06	-01	-05	-02	-09	-07
12.	Rokeach's Dogmatism Scale	-63	-23	09	06	-04	13	08	-09	03	-11	-08		-20	-15	-13	-09	-16
13.	MSU Reading	33	61	06	04	19	-05	01	-03	-15	02	-03	-22		67	59	38	71
14.	CQT - Verbal	31	50	03	02	19	-08	-02	-02	-14	11	-04	-17	67		58	29	83
15.	CQT - Information	30	50	04	03	16	-08	01	00	-12	04	-04	-16	60	60		46	84
16.	CQT - Numerical	18	48	04	02	10	-06	06	01	-07	-03	00	-13	42	31	54		70
17.	CQT - Total Score	33	61	05	03	19	-09	02	-01	-14	05	-03	-19	70	83	87	73	

Note -- Females(N=1310) above the diagonal; Males(N=1436) below the diagonal.
For N=1,000 a correlation of .06 is significant at the .05 level, of .08 at the .01 level.

TABLE 28

Intercorrelations for Wesley's Rigidity Scale and
Some Selected Cognitive and Affective Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Inventory of Beliefs (stereotypy)		18	04	04	12	-10	05	-02	-10	02	-04	-61	20	18	26	14	24	-11
2. Critical Thinking	36		-04	-03	-01	-05	-03	12	-08	02	---	-23	59	53	37	37	56	-05
3. DVI - Traditional Score	01	04		77	62	68	73	-73	-69	-71	-73	13	01	05	12	09	09	26
4. DVI - Future Time	-01	04	75		29	36	41	-54	-43	-64	-59	08	05	02	08	11	08	16
5. DVI - Individualism	11	14	57	24		34	27	-46	-58	-37	-41	06	13	23	27	02	21	22
6. DVI - Puritan Morality	-09	-06	66	34	22		28	-48	-48	-49	-50	19	-04	-07	02	09	---	14
7. DVI - Work Success	04	02	70	38	20	23		-57	-49	-47	-53	05	-09	---	01	02	01	23
8. DVI - Sociability	05	04	-62	-42	-34	-41	-49		37	36	44	-15	04	03	-01	-01	03	-23
9. DVI - Conformity	-12	-16	-68	-43	-60	-38	-45	27		34	35	-03	-12	-14	-19	-14	-20	-15
10. DVI - Relativism	07	-01	-68	-64	-21	-51	-44	17	25		38	-15	---	01	-10	-08	-05	-18
11. DVI - Present Time	-04	02	-72	-53	-41	-48	-52	29	30	37		-06	---	-11	-12	-14	-14	-22
12. Rokeach's Dogmatism Scale	-65	-26	08	06	-02	08	08	-11	01	-05	-06		-21	-13	-17	-15	-19	24
13. MSU Reading	33	59	01	-01	24	-09	-07	05	-14	06	---	-23		62	47	44	69	-04
14. CQT - Verbal	18	50	01	03	22	-10	-09	04	-12	09	-04	-05	61		55	35	84	-01
15. CQT - Information	29	49	01	-02	20	-12	-01	03	-09	09	-06	-10	56	56		37	78	-02
16. CQT - Numerical	18	45	01	-01	11	-11	03	02	-08	02	01	-16	43	29	48		71	01
17. CQT - Total Score	27	61	01	01	23	-14	-03	04	-12	09	-04	-13	68	82	84	72		[illegible]
18. Wesley's Rigidity Scale	-21	-12	16	16	09	06	13	-13	-08	-15	-09	28	-14	-08	-03	-07	-07	

Note -- Females(N-224) above the diagonal; Males(N-260) below the diagonal.
Decimals have been omitted.
For N-224, a correlation of .14 is significant at the .05 level, of .18 at the .01 level.
For N-260, a correlation of .12 is significant at the .05 level, of .16 at the .01 level.

TABLE 2S

Intercorrelations for the Study of Values and Some Selected Cognitive and Affective Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. Inventory of Beliefs		18	03	03	18	-09	00	04	-24	15	-10	-63	22	18	01	04	14	-07	-25	20	13	-01	-01
2. Critical Thinking	35		02	-05	18	00	-03	02	-12	04	-01	-10	63	55	48	45	62	14	-06	13	-16	-12	05
3. DVI - Traditional Score	04	10		71	62	72	68	-72	-65	-73	-75	02	08	05	13	20	15	09	-16	-10	-12	-15	38
4. DVI - Future Time	02	12	76		25	34	25	-54	-36	-56	-53	00	-01	03	01	07	05	01	-02	-02	-02	-18	19
5. DVI - Individualism	11	16	56	25		36	24	-37	-62	-42	-38	-03	28	22	33	31	35	16	-25	04	-12	-14	24
6. DVI - Puritan Morality	-02	-05	64	34	22		30	-57	-35	-54	-57	04	04	-02	06	13	06	06	-22	-06	-10	-11	38
7. DVI - Work Success	01	04	72	40	19	23		-46	-48	-45	-54	03	-02	-06	01	09	01	05	01	-21	-12	00	23
8. DVI - Sociability	05	-01	-70	-53	-38	-45	-51		26	32	42	-01	03	02	-06	-08	-04	-12	10	00	22	06	-21
9. DVI - Conformity	-15	-11	-70	-42	-61	-40	-48	34		30	36	09	-21	-18	-19	-27	-26	-08	20	08	02	07	-25
10. DVI - Relativism	12	-05	-70	-65	-27	-51	-44	30	26		37	-10	00	08	-07	-09	-02	00	05	16	06	13	-34
11. DVI - Present Time	-14	-10	-75	-56	-35	-46	-62	35	39	40		-01	-07	-09	-05	-16	-12	-07	13	03	04	17	-26
12. Rokeach's Dogmatism Scale	-63	-33	11	04	-06	13	15	-14	00	-14	-02		-07	-01	-01	-14	-03	08	-01	-09	-06	01	06
13. MSU Reading	23	62	12	18	14	-11	10	-12	-14	-04	-04	-22		66	64	45	73	22	-29	24	-16	-11	05
14. CQT - Verbal	35	49	11	16	17	-12	08	-13	-16	09	-10	-28	70		59	35	84	16	-28	35	-18	-22	11
15. CQT - Information	34	47	08	09	22	-09	01	-05	-12	03	-08	-25	63	61		50	85	29	-26	13	-17	-11	08
16. CQT - Numerical	20	47	06	08	12	-07	04	-07	-04	-03	-04	-18	46	32	62		73	25	-11	-12	-09	-07	11
17. CQT - Total Score	37	38	10	14	21	-12	06	-11	-14	04	-09	-29	73	83	88	75		28	-27	18	-18	-17	13
18. Theoretical	09	12	16	10	15	-02	20	-20	-07	-08	-11	-07	15	12	29	32	28		-27	-06	-29	-13	-26
19. Economic	-08	07	-08	00	-10	-21	05	02	05	06	09	00	04	01	-02	06	02	-05		-27	-15	09	-31
20. Aesthetic	12	-11	-20	-12	-03	-18	-18	07	14	20	15	-11	06	19	04	-11	07	-13	-28		-29	-21	-22
21. Social	-04	-16	-06	-02	-12	16	-15	18	-02	-02	03	06	-19	-15	-20	-23	-23	-37	-34	-11		-26	-01
22. Political	-13	-05	-14	-14	-08	-22	04	01	15	11	13	16	01	-06	01	06	00	-11	24	-23	-26		-36
23. Religious	03	09	26	14	14	37	07	-08	-21	-22	-22	-02	-06	-10	-09	-07	-11	-27	-42	-28	09	-42	

Note -- Females(N=197) above the diagonal; Males(N=256) below the diagonal.
Decimals have been omitted.
For N=197, a correlation of .14 is significant at the .05 level, of .18 at the .01 level.
For N=256, a correlation of .12 is significant at the .05 level, of .16 at the .01 level.